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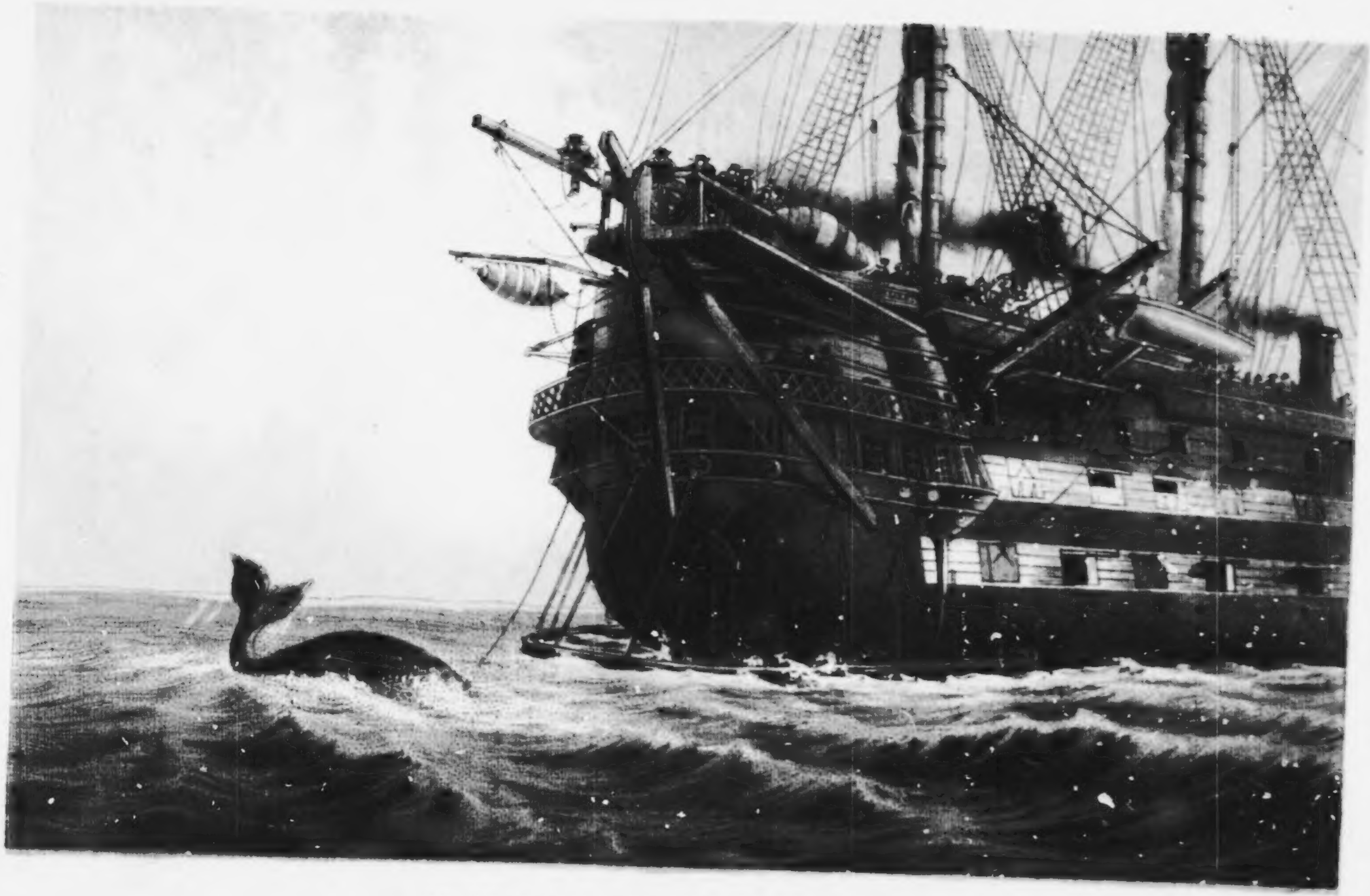

AN UNWELCOME VISITOR TO THE CABLE

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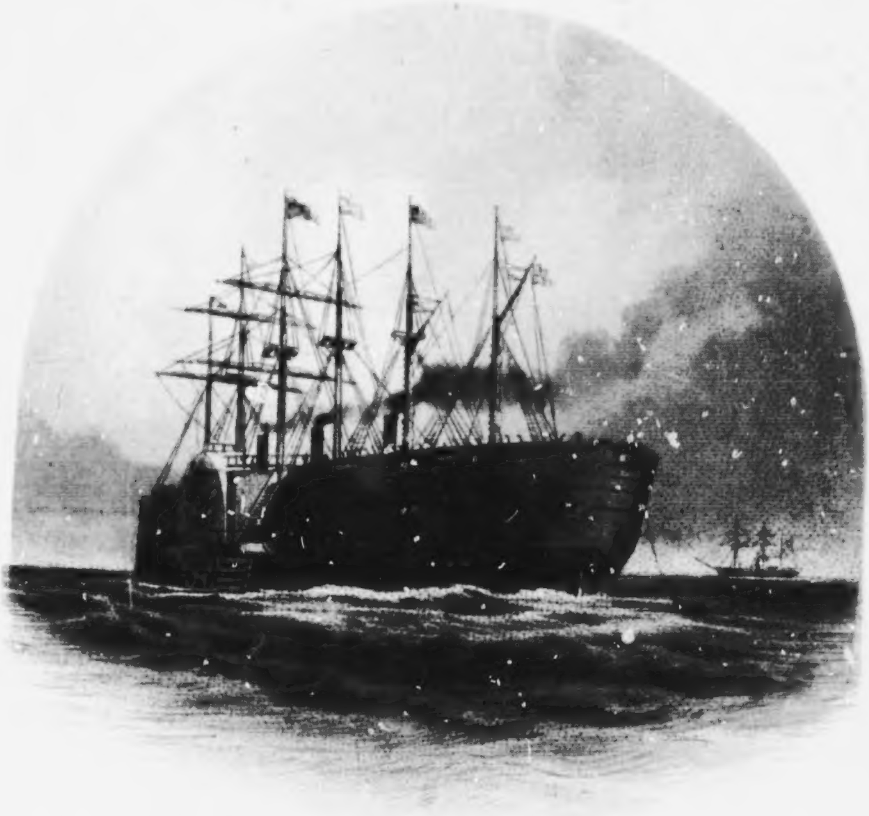
AN UNWELCOME VISITOR TO THE CABLE

page 53

THE
STORY OF CYRUS FIELD

THE PROJECTOR OF THE ATLANTIC CABLE.



THE GREAT EASTERN UNDER WAY

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T. NELSON AND SONS.
LONDON, EDINBURGH AND NEW YORK.

LESSONS FROM NOBLE LIVES

THE

STORY OF CYRUS FIELD

THE PROJECTOR OF THE ATLANTIC TELEGRAPH.

"I'll put a girdle round about the world in forty minutes!"
SHAKESPEARE.

LONDON:
T. NELSON AND SONS, PATERNOSTER ROW;
EDINBURGH; AND NEW YORK.

1877.

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THE STORY OF CYRUS W. FIELD.

Book First.

THE LIFE.

CYRUS W. FIELD was born at Stockbridge, Massachusetts, on the 30th of November 1819.

Stockbridge is one of the fairest villages of New England, lying calmly cradled among the green Berkshire Hills; a region as famous for its picturesque landscapes on the other side of the Atlantic, as among ourselves is the beautiful scenery of the Cumbrian Lakes or the Scottish Highlands. The Berkshire Hills are an extension of the Green Mountain chain, which reaches from Vermont far into Western Massachusetts, and there forms the boundary-line between that State and the State of New York. They are broken up by many a pleasant sylvan valley, through which wind the bright waters of the Housatonic, a stream about as large as the Tweed at Abbotsford. In one of its broader intervals lies Stockbridge, encircled by verdurous heights, and combining in its surroundings every variety of natural beauty,--hill and dale, and meadow and burn, mountain declivities hung with forests, and tall cliffs which frown over the valley below.

Nor is the place without its historical associations. It was once the seat of an Indian tribe, to whom a missionary was sent by the Society for the Propagation of the Gospel, while Massachusetts was still a British colony; and here, more than a hundred years ago, the celebrated Calvinist divine, Jonathan Edwards, preached the gospel in the wilderness.

Like Professor Morse, whose name is also connected with the Atlantic Telegraph, Mr. Field was the son of a country pastor; a class of men who have done much for the honour of New England, by founding churches and colleges, and establishing schools, and thus making the people of that part of the United States as remarkable for intelligence as for the religious constancy they have inherited from their Puritan ancestors. His father—the Rev. David D. Field, D.D.—who died a few years ago, in a green old age, was an admirable specimen of the New England pastor. He was a genuine Puritan, of earnest and unaffected piety, and of a devout and blameless life. In accordance with the Puritan custom, which followed the Jewish hours for the Sabbath, he held that the day of rest began on Saturday at sunset, instead of at midnight, and sometimes checked his children in their sports by saying, "My sons, we are on the borders of holy time." But while thus strict and even rigid, in his religious observances, there was in him, nevertheless, a singular gentleness, which made him an object of universal affection, just as his saintly character secured him general reverence. In his ripe manhood he gained a wide reputation as a preacher, having a masculine intellect, a commanding presence, and the advantage of a clear and powerful voice—a very necessary qualification for a successful orator. But those who knew him only, or knew him best, in his later years, prefer to think of him as the "beautiful old man." When his head was dignified with its crown of white hairs, no one could look upon that noble countenance without a sentiment of tender and affectionate veneration.

In those days the country parson was not, as a rule, rich in this world's goods; and Dr. Field did not make the exception. If not quite like Goldsmith's model pastor,

> "Passing rich on forty pounds a year,"

his annual stipend never at any time exceeded one hundred and fifty. And yet he contrived to give to no fewer than nine children the highest educational advantages the country could afford.

It is evident that this could never have been effected but for the presence in the parsonage of that "angel of the house," a loving, faithful, and capable wife. Mrs. Field, in her early years, had been the beauty of her native village; throughout her useful life she was known for her sunny temper, and her cheerful, hopeful, vivacious spirit. The husband, grave and sober, as became his profession and was natural to his creed, might sometimes cherish sombre views of the present or the future, but they were quickly dispelled by the unfailing buoyancy of disposition which made sunshine in his dwelling all the day long. Hers was a spirit that no troubles could subdue, that bore with womanly heroism all the privations of her lot, that willingly endured the hardest sacrifices for the sake of her children. And so it came to pass that from the little Stockbridge parsonage four sons were sent to college, and prepared to enter with credit on a professional career; while other three sons, and two daughters, received such advantages as could be obtained in the best schools.

The influence of her sanguine and elastic temperament may be traced, we think, in the son whose career the following pages are designed to commemorate; and to his honour, be it said, that the strongest passion of his boyhood was his love for his mother. And never, of a truth, had the children of any mother greater cause to "rise up and call her blessed."

They did not fail to honour her. The family that grew up so happily in that quiet nook of New England have made their mark on American history. Of the sons, the one best known in England is he whose career we shall trace in the present volume, and whose arduous efforts have linked his country to ours by the magic wire. The others, however, are not unknown on either side of the Atlantic. Of the four college-bred sons, the eldest, David Dudley Field, an eminent New York lawyer, has gained a reputation in Great Britain by his vigorous advocacy of Law Reform. He is the author of a series of codes, civil, political, and criminal, the result of twenty years' labour, whose benefit will be felt, not by his own country alone, but by every country where the English law prevails and the English tongue is spoken. Another brother is a judge of the Supreme Court of the United States. A third, now deceased, was a lawyer of large practice in Massachusetts, and for several years the President of the Senate of that State. The fourth, and youngest, occupies a distinguished position as a journalist in New York, and is the author of several popular books; among others, of a "History of the Atlantic Telegraph," to which we shall be largely indebted in the following pages.

In the home and under the happy auspices we have thus briefly described, was born and bred the projector of the Atlantic Telegraph, the pioneer of ocean-telegraphy. His childhood passed, like that of most country boys, with few and simple amusements, duly intermixed with hard study and hard work. The New England winters are long and cold, and through the deep snow-drifts young Cyrus had to trudge to school, finding compensation for his occasional troubles in a slide down-hill or a skate on the ice. In the summer, he rambled in the woods, or breasted the river-current, or managed his little skiff on the nearest "pond." His educational opportunities were such as the village "academy" afforded. From the first, however, unlike his brothers, he showed no very ardent affection for "book-learning," but excelled in all active and athletic pursuits. And he was well fitted to succeed in these, for his frame was lithe and wiry, his physical strength remarkable, his courage undoubted, and his enterprise indefatigable. Whatever he undertook, he carried through. No obstacles could daunt him; indeed, they seemed to intensify his steadfastness of purpose.

He was not allowed, however, to enjoy the pleasures and studies of boyhood for any considerable period. At fifteen years old he was recalled from school, and transferred from the peaceful village to the busy, noisy, boisterous city. It was a bitter moment when he left his childhood's home, and parted from the mother he loved so well. He went out alone into the world, with neither fortune nor friends to support him; but he had what was better—a clear brain, a firm will, and a noble heart.

He began at the bottom of the ladder, entering as a boy in a mercantile office; and working his way upwards slowly by his own strength. And such were his vigour, his industry, and his perseverance, that in the course of six years we find him in business for himself, married, and "settled in life." With such rapidity does an active spirit and a strong intelligence sometimes push its way in the Western World.

The next twelve years were characterized by an incessant application to business. He seemed to think of little else. Steadily improving his position, and amassing wealth, he saw himself, at the end of that time, in possession of ample means, and began to think of retiring from the busy world to enjoy the fruits of his successful labour. This young man, for he was only thirty-three, actually proposed to "retire from business," to abandon the pursuit of fortune; and betook himself, for six months, to South America, with the intention of "taking life easily." The old habits, however, as yet were too strong for him.

Young, robust, and energetic, he could not wholly repress the instinct of action which had made him what he was. The fire still burned in his blood. What should he do? He felt indisposed to sacrifice his manhood, as so many merchant princes have done and do, to the counting-house and the exchange. Yet he was in need of an object. His active brain could not forego employment, and in some way or other he felt he must needs expend his superfluous energy. Thus it was that, soon after his return to New York, he entered upon the great project of the Atlantic Telegraph, which, as we shall see, absorbed the next twenty years of his life, and furnished him with a noble incentive to exertion, while its success most fitly crowned an honourable and distinguished career.

With this brief sketch of the life of Cyrus Field, we proceed to narrate the history of his enterprise in connecting the Old World and the New, the mother-country and her noble daughter in the West, the two lands of Freedom, Law, and Order, by the electric ties of the Atlantic Telegraph.

Book Second.

THE WORK.

CHAPTER I.

HOW IT CAME TO BE DONE.

ENTHUSIASM is the secret of success. Boy or man, you will never do thoroughly any work you have to do, you will never carry out successfully any enterprise you may undertake, unless you throw all your soul and heart into it, unless you are resolved to devote to it your best energies. Read over the bead-roll of the names of men who have deserved well of their fellows, and you will surely find that they were more or less enthusiasts, and that their life-work was more or less thoroughly accomplished according as the fire of enthusiasm burned more or less brightly in their hearts. Enthusiasm, however, is possible only to the devout soul, which feels that its Maker has charged it with responsibilities at the same time that he has dowered it with rare and beautiful gifts; which feels that it is not well to pass away, leaving nothing done or nothing attempted for the greater happiness of humanity. We pray you, therefore, reader, to cultivate this virtue of enthusiasm: for without it your work will fail to the ground, bearing neither fruit nor seed; without it the purer aspirations of your nature will never be developed; without it you will fail to appreciate all the possibilities of your life, and the extent of the good that you may and ought to accomplish. We have spoken of it as the secret of success; we assure you, it is also the secret of happiness. The enthusiast rises superior to the petty troubles of life. When the horizon is clouded, he illuminates it with the sunshine that glows in his own heart. Enthusiasm is the armour which renders him proof against "the arrows and slings of fortune." It is the weapon with which he cleaves down every foe. It is the magic spell which converts the wilderness into a garden, and brightens the path of the pilgrim with the bloom of flowers. It is the talisman which makes all the powers of nature subservient to the will of its possessor. It is the inexhaustible spring of water in the desert at which the wayfarer never drinks without being refreshed. It is the mysterious inner fire which, like the flame of old that burned on Vesta's altar, must never be suffered to wane or die out; for only so long as it glows and warms and kindles may you hope that, in the darkness and the storm of life, your feet will never stumble and your soul never grow afraid.

We purpose to tell the story of a great work, recently achieved, which was achieved by an enthusiast; and which, had it not been stimulated and sustained by a lofty enthusiasm, could never have been successfully wrought.

Let us cast one glance back over the stream of Time, and fix it upon the epoch which witnessed the departure of Columbus from the shores of Spain to explore an unknown ocean.

It was reserved for that great enthusiast to discover a New World, but we must not forget that the object of his voyage was simply to find a shorter pathway to the East. He sought a western passage to rich Cathay, to the treasures and wonders of India. His profound meditations and laborious studies had convinced him that the world was a sphere; but they had not led him to expect that far away in the west lay a mighty continent, equalling in natural wealth those three continents which had hitherto witnessed the development of human history,—Europe, Africa, and Asia. It was his belief that between Spain and the eastern shore of India rolled a vast "world of waters," and that by traversing this ocean-plain he would find a shorter and more direct route than that by the Cape of Good Hope. Even after he had successfully carried his little squadron across the Atlantic, and when upon his astonished gaze rose the wooded hills of San Salvador, he believed that he saw before him one of the islands of the Asiatic coast. When he discovered Cuba, he regarded it as a part of the Indian mainland; in Hayti he thought he recognized the golden Ophir of King Solomon; the great estuary of the Orinoco, whose fresh waters flow for leagues into the sea and undergo no change,—so abundant is their volume, and so powerful their current,—he supposed to be the great river Gihon, which, in the old time, brightened the Garden of Eden. He died in ignorance of the full importance of his discovery. And it is ever so: the enthusiast cannot estimate all the grandeur of the work he does. Gutenberg, when he printed the first book, did not and could not realize the vastness of the results of that successful labour; did not and could not look forward to a time when knowledge would no longer be the prize of the few, but the right of the many. And James Watt, when he perfected the steam-engine, did not and could not foresee the extent of the revolution it was destined to bring about in the world of commercial enterprise. In this truth lies a great encouragement for each of us to do the work he has to do with all his heart, and all his soul, and all his strength; for we cannot guess the real extent and influence of that work, or the way in which it may affect for good the fortunes of our fellow-men.

An American writer, referring to the enterprise of Columbus, very justly remarks that it is hard for us to imagine the darkness and the terror which, at that epoch, hung over the face of the deep. The western ocean was truly a *Mare Tenebrarum*, a Sea of Shadows, haunted by mysterious legends of ill and dread. Columbus was a man of dauntless courage, as well as of unusual nautical skill and experience. He had voyaged to the Western Islands, to Madeira and the Canaries; he had visited the west coast of Africa; he had penetrated as far north as the winter-bound shores of Iceland. Yet when he came to cross the wide ocean that rolled towards the sunset, he had to "grope his way blindly" The little knowledge that he had acquired by years of patient thought and study glimmered very faintly in the depth of the darkness. And so he sailed, not westward, but to the south. On a chart made by Toscanelli, the famous Italian geographer, the east coast of Asia was laid down as lying opposite to the west coast of Africa. Hence Columbus first kept along the latter as far as the Canary Islands, and then bore away, as he thought, for the fragrant shores of India.

It followed, therefore, that he crossed the Atlantic in its widest part. But had he followed the ancient track of the Norse rovers, who had pushed their discoveries as far as Greenland and Labrador, or had he made direct for the Azores, and then kept away to the north-west, he would much sooner have sighted land, and incurred less danger of ruin from the mutiny of a terrified crew. On the other hand, it is possible that he would not have communicated so great an impulse to maritime enterprise. For the land he would have discovered is not so attractive as the rich valleys and spicy groves of Cuba. His followers would not have opened up the golden regions of Mexico and Peru. *Their* discovery might have been deferred for another century, and then how different would have been the course of history; how seriously would the progress of civilization have been delayed! Who can doubt that it was the hand of God which guided the ships of Columbus to the smiling shores of the Mexican Gulf, instead of to the more difficult and the sterner coast of North-eastern America!

It is clear, however, that he crossed the Atlantic where it is *broadest* and *deepest*; where, as a writer reminds us, it rolls over mountains, lofty as the Alps and the Himalayas, lying far below its billowy surface. But, further north, these two continents, the Old and the New, incline much nearer to one another, until the bold promontories of Newfoundland stand over against the green capes of Ireland, even as the white chalk cliffs of England shine across the Channel from France.

Newfoundland! It was to this great island we wished to bring the reader, inasmuch as it is intimately connected with the story we have undertaken to tell. And of its geographical position, as well as of its resources and physical characteristics, it seems desirable that we should say a few words.

Newfoundland occupies much the same position with regard to America as Ireland does to Europe. Stretching far out into the Atlantic, it is "the vanguard of the western continent;" or rather, "the signal-tower from which the New World may speak to the Old."

In dimension, it is equal to England. Surrounded by a barrier of almost perpetual mist, with currents swooping upon it which bring down huge icebergs from the north, and a rocky coast which threatens the mariner with destruction, it has long borne an evil reputation. Yet it has many features both of beauty and agreeableness. Its climate is healthy. Its natural resources are extensive. Its position between the Old and New Worlds marks it out as an important centre hereafter of commercial enterprise. Its fisheries offer a source of permanent wealth, and breed a race of skilful and hardy seamen. Its woods and mountains abound with animals whose skins would richly repay the hunter and the trapper. Its forests are full of great tall trees, whose timber would fetch a high price in the European and American markets. It has its herds of deer and its coveys of game; and industry in due time will convert its rugged plains into fields of fruitfulness.

It has been remarked that, in many of its natural features, Newfoundland is not unlike Scotland,— even in its most desolate portions, where vast rocky moorlands, covered with thick moss, remind the emigrant Scot of the heather-blooming wilds of his own "romantic land." In the interior are lakes as long and as beautiful as Loch Lomond, and mountains not less lofty or picturesque than Ben Cruachan or Ben Nevis. There are passes as wild as the Vale of Glencoe; ravines and deep pine-clad glens which remind the traveller of the Scottish Highlands; and foaming torrents whose roar sounds like an echo from the

> "Land of brown heath and shaggy wood,
> Land of the mountain and the flood."

Nor is it a very cold country, where, as in Greenland, winter rules over two-thirds of the inhospitable year. It does not lie so far north as Scotland; and as it feels the influence of the Gulf Stream, its climate is by no means unendurable.

Give it an industrious population, and bring to bear upon it the latest developments of agricultural skill, and we know no reason why it should not become an [illegible]n-oasis of fertility.

At present, however, it is comparatively unknown. The great steam-ships which ply between Europe and America avoid its foggy shores. Its interior is almost unpeopled; is without roads, and therefore without towns. Its principal wealth is in its fisheries, and its only places of importance are the trading posts and ports on the eastern side. Its capital is St. John's, whose noble harbour has, unfortunately, a difficult approach. It has no railways, as might be supposed; and the Anglican or Roman Catholic bishop, when he would pay his annual visit to his scattered communities, is compelled to trust himself to the mercy of the stormy seas, and sail round his island diocese in his yacht.

It was in one of these excursions that Bishop Mullock, lying one day becalmed in sight of Cape North, the extreme point of the province of Cape Breton, bethought himself, it appears, how extensively Newfoundland would profit if it could be brought within the line of communication between Europe and America. He observed that Nature, on the west, had provided a series, as it were, of stepping-stones or stages,—Newfoundland, St. Paul's Island, Cape Breton. The idea that "something might be done," took such firm possession of his mind, that on his return to St. John's he wrote a letter to one of the newspapers. As this appears to be the first suggestion of

AN ATLANTIC TELEGRAPH—

of an electric chain of communication between the Old World and the New—of that extraordinary enterprise which has realized the words placed by the poet in the mouth of fairy Puck, "I will put a girdle round about the world in forty minutes"—we think it well to submit it to our readers:—

"*To the Editor of the 'Courier.'*

"SIR,—I regret to find that, in every plan for Transatlantic communication, Halifax is always mentioned, and the natural capabilities of Newfoundland [are] entirely overlooked. This has been deeply impressed on my mind by the communication I read in your paper of Saturday last, regarding telegraphic communication between England and Ireland, in which it is said that the nearest telegraphic station on the American side is Halifax, twenty-one hundred and fifty-five miles from the west of Ireland. Now would it not be well to call the attention of England and America to the extraordinary capabilities of St. John's, as the nearest telegraphic point? It is an Atlantic port, lying, I may say, in the track of the ocean steamers; and by establishing it as the American telegraphic station, news could be communicated to the whole American continent forty-eight hours *at least* sooner than by any other route. But how will this be accomplished? Just look at the map of Newfoundland and Cape Breton. From St. John's to Cape Ray there is no difficulty in establishing a line passing near Holyrood along the neck of land connecting Trinity and Placentia Bays, and thence in a direction due west to the Cape. You have then about forty-one to forty-five miles of sea to St. Paul's Island, with deep soundings of one hundred fathoms, so that the electric cable will be perfectly safe from icebergs. Thence to Cape North, in Cape Breton, is little more than twelve miles. Thus it is not only practicable to bring America two days nearer to Europe by this route, but should the telegraphic communication between England and Ireland, sixty-two miles, be realized, it presents not the least difficulty. Of course, we in Newfoundland will have nothing to do with the erection, working, and maintenance of the telegraph; but I suppose our Government will give every facility to the company, either English or American, who will undertake it, as it will be an incalculable advantage to this country. I hope the day is not far distant when St. John's will be the first link in the electric chain which will unite the Old World and the New.

J. T. M.

"ST. JOHN'S, *November 8, 1850.*"

We next find the idea ripening in the mind of a Mr. Frederick N. Gisborne, a telegraph operator, to whom it may have been suggested by Bishop Mullock's letter. Or it is possible that it occurred almost simultaneously to both men.

At all events, to Mr. Gisborne is due the merit of having been the first to attempt its realization.

In the spring of 1851 he visited Newfoundland, and submitted to its Legislature the project of an overland line from St. John's to Cape Ray, nearly four hundred miles in length, with a communication between Cape Ray and Cape Breton by steamer and carrier-pigeons, and, eventually, a submarine cable across the Gulf of St. Lawrence.

The Legislature received the proposal with much favour, granted £500 to Mr. Gisborne to make an exploratory survey of the proposed line to Cape Ray, and passed an act authorizing its construction.

The survey was carried out through wood and wilderness, and a company formed to provide funds for the successful prosecution of the undertaking. In 1853, however, when about forty miles had been completed, the company failed, involving Gisborne and his assistants in severe distress. The energetic engineer was necessarily much discouraged, but plucking up heart, he repaired to New York, where he was fortunate enough to obtain an introduction to Mr. Cyrus W. Field, to whom he told his story; and reflecting upon it, Mr. Field was led to conceive the grander idea of extending the proposed communication across the Atlantic. It was while turning over the globe in his library that the idea first flashed upon his mind, "Why not carry it across the ocean?"

This idea, as his brother honestly says, was not original with Mr. Field, though he was to be the instrument in the hands of Providence of carrying it out. It was indeed a new idea *to him;* but it had long been a matter of speculation with scientific minds, though their theories had never attracted his attention. But once he had grasped it, it took strong hold of his imagination, and led him to entertain the Newfoundland scheme, as preliminary to the other. He cared little about shortening communication with Europe merely by a day or two, by relays of boats and carrier-pigeons! But it was the hope of further and more magnificent results which inspired him, giving him courage to throw himself into an enterprise whose end no man could foresee.

Such an enterprise, however, was not to be undertaken without careful preparation. And Mr. Field began to clear the way by consulting the highest scientific authorities both in England and the United States. Two questions were ever present to his mind :—

1. Was it possible to carry a cable across the ocean?

2. And if so, would it be able to convey messages?

The first related to mechanical difficulties only,—such as the depth of ocean, the nature of the ocean-bed, the effect of a heavy pressure of water, the influences of winds and currents. The second referred to pure science, and the conditions under which the electric fluid acts: would the lightning flash from shore to shore across an intervening waste of sea?

The answer to the first question was supplied by Lieutenant Maury, the eminent physicist and geographer, who pointed out that between Ireland and Newfoundland the bottom of the sea formed a *plateau*, or elevated table-land, which, as he said, seemed to have been placed there especially for the purpose of supporting the wires of an electric telegraph, and protecting them from injury. Its slope, he said, was quite regular—gradually increasing from the shores of Newfoundland to the depth of from 1500 to 2000 fathoms as you approach the Irish coast. It was neither too deep nor too shallow; deep enough to protect the cable from danger by ships' anchors, icebergs, and currents; shallow enough to secure that the wires should be readily lodged upon the bottom. From Professor Morse an equally satisfactory answer was obtained. He declared his faith in the undertaking as a practicable one; that it might, could, and would be achieved.

Thus encouraged, Cyrus Field resolved to devote himself to his brilliant but daring enterprise; an enterprise to be prosecuted to a successful end only by the loftiest enthusiasm, the serenest patience, and the most consummate energy. He himself did not comprehend all the difficulties that surrounded it, all the sacrifices it involved. He thought that he was risking a few thousand pounds in an uncertain venture, and the probable loss did not concern him greatly; but it is certain that he never imagined he might be drawn on to engage in it the whole fortune he had accumulated; to sacrifice all the peace and tranquillity he had hoped to enjoy; that for twelve years, like a new Odysseus, he was to be homeless, restless and a wanderer, crossing and recrossing the seas, and seeking support both in Europe and America. So it is, says a judicious writer, that the Being who designs great things for human welfare, and would accomplish them by human instruments, does not lift at once the curtain from the stern realities they are to meet, nor reveal the rugged ascents they are to climb; so that it is only when at last the heights are attained, and they look backward, that they realize through what they have passed.

Mr. Field's first step was to secure the co-operation of a sufficient number of capitalists; and in New York he was fortunate enough to enlist the generous assistance of such well-known merchant princes—men of probity, of intelligence, of liberal sympathies—as Peter Cooper, Moses Taylor, Marshall O. Roberts, and Chandler White. On the death of Mr. White, in 1856, the little band was joined by Mr. Wilson G. Hunt. The Company thus quietly formed at once adopted Mr. Field's idea, and undertook to carry it out.

A Commission was despatched to Newfoundland to lay the scheme before its Government, and obtain a charter and pecuniary assistance. Successful in these preliminary operations, our capitalists adopted the title of the "New York, Newfoundland, and London Telegraph Company;" and set to work with so much vigour, that the portion of the line which traversed Newfoundland, a portion 400 miles in length, was completed by the summer of 1856. In a few more months the line was laid across Cape Breton—140 miles. Almost simultaneously the ocean cable, after some mishaps, was successfully deposited beneath the waters and across the broad estuary of the Gulf of St. Lawrence, under the personal superintendence of Mr. Canning, the engineer.

Thus the first part of the work was done. The telegraph had been carried beyond the United States, through the British provinces, to St. John's in Newfoundland, a distance from New York of more than 1000 miles, at a cost of about £500,000, of which Mr. Field paid over one-fifth.

Before the Company undertook the second and more difficult part, it was thought advisable to ascertain, by a series of careful soundings, the exact nature of the ocean bottom over which the cable connecting Newfoundland with Ireland would have to be laid. Mr. Field applied, for this purpose, to the American Government, who immediately despatched the *Arctic,* under Lieutenant Berryman, on this useful and most necessary service. She sailed from New York on the 18th of July 1856; and on the following day Mr. Field left in the steam-ship *Baltic* for England, to organize the Atlantic Telegraph

Company. The *Arctic* proceeded to St. John's, and thence went on her way across the deep, in three weeks reaching the coast of Ireland; and clearly demonstrating, as the result of her survey, the existence of a great plateau underneath the ocean, extending all the way from the New World to the Old.

To make assurance doubly sure, Mr. Field solicited the British Admiralty "to make what further soundings might be necessary between Ireland and Newfoundland, and to verify these made by Lieutenant Berryman." In response to this appeal, the Admiralty sent out the *Cyclops*, under Lieutenant Dayman, a very capable officer, who executed his task with great zeal and success. He showed that the depth of water on the so-called telegraphic plateau, the elevated table-land which Providence had raised between the two continents, nowhere exceeded two thousand five hundred fathoms, or fifteen thousand feet. Such a depth is almost trivial compared with the enormous depths in other parts of the Atlantic, where you might hide from all human eyes the loftiest snow-clad peak of the Himalayas: yet no inconsiderable depth, if you reflect that the Peak of Teneriffe, were it here "cast into the sea," would sink out of sight, island, mountain, and all; and even the colossal crest of Mont Blanc would rise but a few hundred feet above the waves!

The single exception to this uniform depth occurs about 200 miles off the Irish coast, where, within an area of about a dozen miles, the depth sinks from 550 to 1750 fathoms! In 14° 48′ W., says Dayman, we have 550 fathoms rock; and in 15° 6′ W., we have 1750 fathoms ooze. In little more than ten miles of distance a change of depth takes place, amounting to fully 7200 feet. It was supposed that this tremendous declivity would be the chief point of danger in laying down the cable; and to remove, if possible, the anxiety which existed, Captain Dayman made a further survey. The result showed that the dip was not a sudden one: the precipitous bank, or submarine cliff, turned out to be a gradual slope of nearly sixty miles. Over this long slope, says a writer in the *Times*, the difference between its greatest height and greatest depth is only 8760 feet; so that the average incline is, in round numbers, about 145 feet per mile. A good gradient on a railway is now generally considered to be one in 100 feet, or about 53 feet in a mile; so that the incline on this supposed bank is only about three times that of an ordinary railway.

It was found, from these surveys, that the ocean-bed consisted of a soft ooze,—as soft as the moss that clings to old damp stones on the river's brink. And of what does this ooze consist? The microscope revealed the astonishing fact that it is made up of myriads of shells, too minute to be discovered by the naked eye, yet each perfect in itself, unbroken and uninjured. These organisms live near the surface of the water, but in death sink down to the bottom, and find there a calm and peaceful resting-place. Well has it been said that a mighty work of life and death has for ages been going on in the tranquil bosom of Ocean! Myriads upon myriads, ever since the morning of creation, have been falling—falling like snow-flakes, till their remains cover with a thick stratum of beautiful organisms the ocean-bed.

"The bearing of this discovery," says Dr. Field,* "on the problem of a submarine telegraph, was obvious. For it, too, was to lie on the ocean-bed, beside and among these relics that had so long been drifting down upon the watery plain. And if these tiny shells slept there unharmed, surely an iron cord might rest there in safety. There were no swift currents down there; no rushing waves agitated that sunless sea. There the waters moved not, and there might rest the great nerve that was to pass from continent to continent. And so far as injury from the surrounding elements was concerned, there it might remain, whispering the thoughts of successive generations of men, till the sea should give up its dead."

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* In an interesting volume, the "History of the Atlantic Telegraph" (New York: Scribner, 1867), to which we must again acknowledge our obligations.

Everything showed that the project of an Atlantic Telegraph was feasible. All that remained was, to raise the capital necessary for its development. But this could be done only by the formation of a large and influential company, the enterprise having outgrown the resources of Mr. Field and his little band of New York merchants. While engaged in submitting his scheme to the consideration of the capitalists of London, Mr. Field found counsel and encouragement from many men distinguished in the world of science, and among his principal supporters had the good fortune to rank Glass and Elliot, now so well known as manufacturers of sea-cables; and the celebrated engineers whose names are associated with the scientific marvels of the age—Brett, Bidder, Robert Stephenson, and Brunel. The last named was then building the colossal ship afterwards called the *Great Eastern;* and one day, taking Mr. Field down to see her gigantic hull as it lay in the yard at Blackwall, he exclaimed—and events have proved, prophetically,—"There is the ship to lay your Atlantic Cable!" Mr. Field was also aided by the scientific skill of Morse and Bright, the celebrated electricians; and of Dr. Whitehouse, who had devoted many years to experiments in electro-magnetism as connected with telegraphy. He was the inventor of an instrument for ascertaining and registering the velocity of electric currents through submarine cables. These three gentlemen entered upon a series of elaborate investigations with the view of determining at what rate messages could be forwarded; and they came to the conclusion that, at ten words in the minute, and allowing ten words for name and address, they could safely calculate on the transmission of a twenty-word message in three minutes;

Twenty such messages in the hour;

Four hundred and eighty in the twenty-four hours, or fourteen thousand four hundred words per day.

Such they considered to be a fair computation of the capabilities of a single wire cable.

Another point to be determined was, the possibility of successfully insulating the electric wire when sunk in water; for, without perfect insulation, telegraphic communication would be impossible, from the quick dissipation of the electricity. Such a mode of insulation was found in the employment of gutta-percha—-a substance discovered but a few years previously—as a coating of the wire. Gutta-percha is impenetrable by water, and a bad conductor of electricity; hence it affords a complete protection and insulation to a telegraph carried through the waters of the Atlantic.

These preliminaries settled, Mr. Field addressed himself to the British Government, and invited their patronage and support of an undertaking which could not but largely benefit the commercial interests of England. The reply of the Government (November 1856) was prompt and satisfactory: they promised to furnish ships to take what soundings might be required, and to assist in laying down the cable, and to pay, from the time of the completion of the line, and so long as it continued in working order, an annual sum of £14,000, as a fixed remuneration for work done on behalf of the Government in the outward and homeward conveyance of their messages; this payment to last until the net profits of the Company amounted to a dividend of six per cent. on the capital invested, when it was to be reduced to £10,000 a year, for a period of twenty-five years. It was added that, if the Government messages in any year, at the usual tariff rate charged to the public, amounted to a larger sum, such additional payment would be made as would balance the overplus.

The Atlantic Telegraph Company was then started. Its capital, £350,000, was subscribed in three hundred and fifty shares of £1000 each in a very few weeks; Mr. Cyrus Field, with his accustomed liberality of spirit, taking fully one-fourth of the whole. The directors included the names of Messrs. Gurney, Brooking, Brett, and Hankey, of London; Sir William Brown, Messrs. Harrison, Johnston, Crosbie, Maxwell, and Pickering, of Liverpool; Pender and Dugdale, of Manchester; Professor Sir William Thomson, of Glasgow; and two eminent American merchants in

London, Messrs. Peabody and Lampson. A contract for the manufacture of the cable was made with Messrs. Glass, Elliot and Co. of London; and Messrs. R. S. Newall and Co. of Liverpool,—the whole to be completed by the 1st of June 1857. And on the 10th of December, the indefatigable Mr. Field sailed for America, to obtain a subsidy from the American Government. And this, through the support of Mr. Seward and Mr. Rusk, who saw that the cable would become a permanent pledge of peace between the two great nations which, on opposite sides of the Atlantic, uphold the interests of constitutional freedom and commercial enterprise, was finally granted. But considerable opposition was raised in the United States Congress, partly on the ground that it was unconstitutional to encourage a private project for the monopoly of telegraphic communication, partly on the score of economy, and partly out of an unwise jealousy of England. These objections, however, were successfully refuted by the most eminent of the statesmen of America; and the bill finally passed both the Houses of Representatives, and was signed by President Pierce on the 3rd of March 1857.

CHAPTER II.

HOW IT WAS ATTEMPTED.

BOTH the British and the American Governments showed their sense of the importance of the great enterprise whose early stages we have been describing, by lending ships of war for the purpose of stowing and laying down the telegraphic cable. The American Government sent the *Niagara*, a steam-frigate remarkable for size and speed, accompanied by the paddle-wheel steamer *Susquehanna;* and the British, the *Agamemnon*, a noble war-ship, which had carried an admiral's flag at the bombardment of Sebastopol. The *Niagara* was commanded by Captain Hudson; the *Agamemnon*, by Captain Noddal. The former took on board that half of the great cable which had been manufactured by Messrs. Newall and Company of Birkenhead—in all about 1300 miles in length;

the latter, that half constructed by Messrs. Glass, Elliot and Company of London. Both ships completed the arduous work of stowing away their cargo towards the end of July, and each celebrated the event by general rejoicings on board.

The *Niagara* and the *Agamemnon,* every preparation being completed, sailed from Liverpool and Gravesend respectively for their rendezvous at Queenstown, where they arrived in safety, accompanied by their respective consorts, the *Susquehanna* and the *Leopard.* The presence of the two ships with the cable on board gave the electricians a much-desired opportunity of testing its integrity. Accordingly, one end of each cable was carried to the opposite vessel, and so joined as to form a continuous length of 2500 miles, both ends of which were on board the *Agamemnon.* One end was then connected with the apparatus for transmitting the electric current; and on a sensitive galvanometer being attached to the other end, the whole cable was tested throughout its length, and found, after two days' experiment, to be perfect.

The expedition then bore up to Valentia Bay, the European terminus of the cable. Here it was resolved that the cable should be submerged *in a continuous line* from Valentia Bay to Newfoundland. The *Niagara* was to lay the first half from Ireland to the middle of the Atlantic; the end would then be joined to the other half on board the *Agamemnon*, which would carry it on to the Newfoundland coast. During the operations the four vessels would keep close together, and render whatever assistance might be required. The electricians on board were also instructed to send back messages to Valentia, to report the progress made every day.

Meantime, three other ships had arrived to join the expedition: the steamer *Advice;* a small despatch-boat, appropriately named *Willing Mind;* and the *Cyclops*, under the command of Captain Dayman, who, as we have seen, was thoroughly conversant with the route the squadron was about to take. On Wednesday, the 5th of August, the end of the cable intended to be permanently fixed at Valentia was safely landed, in the presence of the then Lord-Lieutenant of Ireland, the Earl of Carlisle, and a brilliant assemblage; and early on the following morning the squadron departed on its errand of peaceful enterprise.

The arrangements which had been made on

board the *Niagara* and *Agamemnon* for paying out the cable may here be described.

It was arranged so as to come up from the hold of the ship sweeping round a central block or core planted in the midst, to prevent any interference of the unrolling strands with one another, or too sudden turns, which might twist the cable into kinks. Having reached the open space above the deck, it was to be wound out and in, round four grooved sheaves, geared together by cogs, and planted so firmly on girders as to render it impossible that they should be thrown into confusion.

From sheaves accurately grooved, the cable proceeded three or four feet above the poop-deck, until it passed over a fifth grooved sheave standing out upon rigid arms over the bulwark. From this it would make its plunge into the still depths of the great ocean, and as the vessel moved would be dragged out by its own weight, and by the hold which it would necessarily have acquired upon the bottom of the sea.

The paying-out sheaves were large grooved drums, five feet in diameter, and set in a vertical plane, one directly before the other, and having a friction drum attached to them in such a way that its shaft revolved three times as fast as theirs, the axis of the drum being encircled by two blocks of hard wood, which could be griped close upon its circumference by screw power, so as either to retard or arrest altogether the movement of the sheaves.

The screw was worked by a crank, at which a trustworthy officer was stationed, to keep a wary eye upon an indicator close at hand which would express the exact amount of strain thrown upon the cable at each instant.

In the electrician's department it was arranged that signals should be given every second by electrical currents traversing the entire length of the cable, from the shore-end, or from ship to ship. At the side of the vessel patent logs hung down into the water, to measure their velocity. A curiously devised wheel, in the submerged log, was arranged to *make* and *break* an electric circuit at every revolution, a gutta-percha covered wire running up from the revolving wheel on to the deck of the ship, so as to carry the current whenever the circuit was made, and record, on a piece of apparatus provided for the purpose, the progress of the vessel. The brakesman was instructed to watch the tell-tale, which would indicate the strain on the rope, and work his crank and loosen his gripe whenever this seemed to be too great; or tighten his gripe if ever the bell ceased to report that the electric path from one extremity of the cable to the other was free and unimpaired. An external guard had been placed over the screw-propellers of the vessels, to prevent the cable from fouling, in case any necessity should arise for the vessels to move astern.

The *Agamemnon*, as well as the *Niagara*, had been suitably rigged for this special service; her heavy masts and shrouds being replaced by jury-masts and lighter tackle. In the event of a sudden and unforeseen storm, arrangements had been made for quickly slipping the cable. On the decks of the two ships two large reels were erected, each wound round with two and a half miles of a very strong auxiliary cable composed of iron wire only, and capable of resisting a strain of ten to twelve tons. Should the telegraph cable be endangered it would be divided, and the sea-end attached to one of the strong supernumerary cords stored upon the reel; this being rapidly run out, would lower the cable into far ocean-depths, where its safety would effectually be secured. Thus, as Dr. Russell observes, every possible contrivance that ingenuity could devise or scientific knowledge could suggest, according to the experience then attained, had been adopted in order to secure success.

It was on the evening of August the 7th that the squadron sailed; and, according to arrangement, the *Niagara* at once began to pay out the cable very slowly. But before five miles had been accomplished, the heavy shore-end of the cable got entangled with the machinery, through the carelessness of one of the men in charge, and parted. The *Niagara* put back, and the cable was "underrun" the whole distance. At length the end was raised from the water and "spliced" to the gigantic coil, and as it dropped safely to its resting-place among the "salt sea ooze," the noble ship once more went on her way.

Saturday, we are told, was a day of beautiful weather. The squadron made good progress, at a rate of from four to five miles an hour, and the cable was paid out at a speed somewhat exceeding that of the ship, to allow for any inequalities of surface on the bottom of the sea Meantime, a constant communication was kept up with the land. Every moment the electric fluid flashed between ship and shore. Not only did the electricians "wire" back to Valentia the progress they were making, but the officers on board sent messages to their friends in America, to go out by the steamers from Liverpool. The very heavens seemed to regard the enterprise with favour. All went merrily as a marriage-bell. Without a kink the coils came up from the vessel's hold, and, unwinding easily, passed over the stern into the sea. Once or twice, however, a momentary alarm was caused by the cable being thrown off the wheels; an accident due to the insufficient width and depth of the sheaves, and to the fact that they were filled with tar, which hardened in the air. This defect was remedied in later expeditions. Still it worked well, and so long as the terrible brakes withheld their iron grasp, might work through to the end.

On the following day, Sunday, the course of affairs was not less smooth; and on Monday the expedition was upwards of two hundred miles from land. The shallow waters of the coast had been safely traversed. The ships had passed over the submarine declivity which we have already described, and had reached the deeper waters of the Atlantic, where the cable sunk to a depth of not less than two thousand fathoms. Still the iron cord buried itself in the profound silence, and every instant the flash of light in the telegraph room recorded the continuous passage of the mysterious electric current.

About four o'clock on Tuesday morning, however, a sudden interruption occurred. All at once the signals ceased, and the electrical continuity was broken. It seems, from the published narrative, that the cable was running out fully at the rate of six miles an hour, while the ship was making only four. To check this waste, the engineer applied the brakes very firmly, with the effect of stopping the machine. Hence a heavy strain told on the submerged portion of the cable. The stern of the ship was down in the trough of the sea, and as it rose upward on the swell, the pressure became too great, and the cable parted.

Instantly a cry of grief and dismay ran through the ship. She was checked in her onward career, and in five minutes all gathered on deck with feelings which can be better imagined than described. One who was present wrote: "The unbidden tear started to many a manly eye. The interest taken in the enterprise by all, every one, officers and men, exceeded anything I ever saw, and there is no wonder that there should have been so much emotion at our failure." Captain Hudson says: "It made all hands of us through the day like a household or family which had lost their dearest friend, for officers and men had been deeply interested in the success of the enterprise."

The cable broke in 2000 fathoms water, when about 330 nautical miles were laid, at a distance of 280 miles from Valentia.

After consultation between Mr. Field, the electricians, and engineers on board, it was determined that it would be unwise to renew the attempt with only 1847 miles of cable to draw upon, and orders were given to put about the squadron and return to England.

Mr. Field landed at Portsmouth on the 13th, hurried up to London to meet the directors of the Telegraph Company, and with characteristic energy urged an immediate renewal of the enterprise. But on consideration it was thought advisable to postpone it to the following year. Six hundred miles of new cable were required to make up for the three hundred which had fallen to the share of Neptune, and to provide a surplus in case of accidents; obviously, too, an improvement of the paying-out machinery was desirable; and further pecuniary supplies were urgently needed. The autumn of 1857 and the spring of 1858 were devoted to these indispensable objects. Mr. Field laboured with might and main; toiling early and late; knowing no discouragement, making light of every difficulty; and exhibiting a patience, an energy, and a hopefulness which could not but command eventual success. The Company, after some delay, contrived to raise an additional capital of £100,000; and appointed Mr. Field general manager (who accepted the trust, but expressly refused to receive any compensation for his services): nine hundred miles of new cable were manufactured by Messrs. Glass, Elliot, and Co.; and the paying-out machinery was greatly improved by the adoption of a self-regulating brake, invented by Mr. Appold.

CHAPTER III.

HOW THE WORK FAILED A SECOND TIME.

ON Thursday, June 10th, 1858, the *Agamemnon* and the *Niagara*, accompanied by the British war-steamers *Valorous* and *Gorgon*, sailed from Plymouth, with the cable safely stowed on board. It was ordered that the two great ships should proceed together to a point midway between Valentia and Trinity Bay, Newfoundland; there splice the cable, of which each carried a section; and then, turning their bows to east and west, proceed to their respective destinations.

The voyage began with the most auspicious omens. The day was one of the mildest in England's "leafy month of June," and there was scarce a ripple on the surface of the glassy sea. At night it was almost a dead calm, and the sails flapped idly against their masts, with no other movement than that arising from the progress of the vessels, which forged ahead, under easy steam.

On Sunday, however, the wind rose, and as the wind rose the barometer rapidly fell, while every sign indicated to a seaman's eye the approach of boisterous weather. From this time the expedition encountered a succession of gales for upwards of a week. On Sunday, the 20th, the hurricane reached its highest, and the spirit of the tempest was abroad upon the waters. The *Niagara* and the *Agamemnon* parted company. The course of the latter brought her into full collision with the storm, and at one time she was in great danger. It is no exaggeration to say that the waves ran mountain-high; and the ship, owing to the immense weight of the cable, laboured deep in the trough of the sea, almost unmanageable. Nothing but the skilful seamanship of her officers and the steady courage of her crew carried her safely through the terrible trial. But on the 21st she was enabled to bear up for her rendezvous in mid-ocean, which she reached on the 25th, after sixteen days of imminent peril. She was gladly greeted by her consort, the *Niagara*, which had weathered the storm with far less difficulty.

At half-past two on the 26th, the *Agamemnon* and the *Niagara* first spliced the cable, which, however, fell foul of the "scraper" on the latter ship, and broke. A second splice having been effected, the vessels started; the *Niagara* steaming towards the New World, and the *Agamemnon* towards the Old. Soon after six o'clock a large whale approached the starboard bow of the latter, rolling heavily, and lashing the sea into foam. Apparently she was bent on destroying the cable, but to the relief of all on board she passed slowly astern,—just grazing the cable, it is true, but doing no mischief. When the *Agamemnon* had payed out 37½ miles, the continuity of the electric current suddenly ceased, and the electricians declared that the cable had broken at the bottom. As the *Niagara* was hauling in her portion, of which she had let go 43 miles, it snapped close to the ship.

On the 28th of June a third and final splice was effected. The *Niagara* made sail N. W. ¾ N. At 4 P.M. on the following day, when 111 miles had been run out, her electricians reported that another interruption had occurred. The cause was soon ascertained. The *Agamemnon* had steamed 118 miles, and paid out 146 miles of cable, when the coil on her upper deck became exhausted.

Speed was slackened, in order to shift it to the lower deck, when all at once it snapped again! The weather at the time was calm, and the ship's speed moderate—about five knots; the strain 2200 lbs., one-third less than the computed breaking strain: in fact, all the conditions seemed favourable, and yet the cable parted, suddenly and silently. The *Niagara* had to cut the cable, having no means of recovering what she had paid out, and thus she lost 144 miles.

What was to be done? Nothing, but to return to Ireland, preparatory to another attempt. The *Niagara* was the first to arrive at Queenstown, and was followed on July 12th by the *Agamemnon*. A special meeting of the Company being summoned, it was determined that the enterprise should be resumed without delay. An adequate length of cable still remained, and the only thing which caused the slightest doubt was the singular way in which the cable had last parted. The two other breakages could be explained; but in the last was something not so readily understood—something which seemed to point to a mysterious agency existing in the ocean-depths, beyond the ken of science or the control of man.

At midnight, on the 28th of July, the *Aga-*

memnon and *Niagara* once more met, and on the following morning once more parted, in mid-ocean.

On the 30th, 265 miles of cable had been paid out.

On the 31st, 540 miles.

On the 1st of August, 884 miles.

On the 2nd, 1256 miles.

On the 4th, 1854 miles.

On the 5th, 2022 miles.

The *Agamemnon* cast anchor in Dowlas Bay, Valentia, and commenced preparations to connect the ocean and shore ends of the cable.

On the same day, at 1.45 A.M., the *Niagara* anchored in Trinity Bay, Newfoundland; and, one hour later, a signal flashed across the Atlantic the glad intelligence that the cable had been landed from the *Agamemnon*, and that the great work of uniting the two worlds by an electric chain had been successfully accomplished.

On the 18th of August the English directors of the Telegraph Company telegraphed the following message to their American colleagues in New York :—

"Europe and America are united by telegraphic communication. 'Glory to God in the highest; on earth peace, good will towards men!'"

The message occupied thirty-five minutes in transmission.

Soon afterwards an appropriate communication was telegraphed from the Queen of England to the President of the United States. It ran as follows :—

"*To the President of the United States, Washington.*

"The Queen desires to congratulate the President upon the successful completion of this great international work, in which the Queen has taken the deepest interest.

"The Queen is convinced that the President will join with her in fervently hoping that the Electric Cable which now connects Great Britain with the United States will prove an additional link between the nations whose friendship is founded upon their common interest and reciprocal esteem.

"The Queen has much pleasure in communicating with the President, and in renewing to him her wishes for the prosperity of the United States."

The following is the text of the President's reply :—

"WASHINGTON CITY, *August 16, 1858.*

"*To Her Majesty Victoria, Queen of Great Britain.*

"The President cordially reciprocates the congratulations of Her Majesty the Queen on the success of the great international enterprise accomplished by the science, skill, and indomitable energy of the two countries. It is a triumph more glorious, because far more useful to mankind, than was ever won by conqueror on the field of battle.

"May the Atlantic Telegraph, under the blessing of Heaven, prove to be a bond of perpetual peace and friendship between the kindred nations, and an instrument destined by Divine Providence to diffuse religion, civilization, liberty, and law throughout the world. In this view, will not all nations of Christendom spontaneously unite in the declaration that it shall be for ever neutral, and that its communications shall be held sacred in passing to their places of destination, even in the midst of hostilities?

(*Signed*) "JAMES BUCHANAN."

On both sides of the Atlantic the rejoicings at the success of Mr. Field's great enterprise were widespread and sincere; and it was universally felt that to his energy and perseverance it was mainly due. What hours of labour and anxiety he had undergone! Over how many difficulties had he triumphed! A weaker mind, a less patient spirit, a more sordid heart, would have quailed before the succession of obstacles which circumstances had raised in his path. But he had toiled, and endured, and conquered, as all *shall* conquer who will consent to toil and suffer. In Mr. Field's case his efforts were crowned with material success. This is not *always* the lot of the enthusiast; and yet, be sure that in some shape or other success *will* be the guerdon of his labour. He will feel himself strengthened by it, purified by it, exalted by it; and if not in the present, yet in the hereafter he will enter into the fulness of his reward!

CHAPTER IV.

HOW THE WORK WAS DONE.

On the 25th of August it was announced that "the cable worked splendidly," and popular enthusiasm rose to its highest pitch. But while both the Old World and the New were celebrating the successful completion of an enterprise which enabled them to speak to one another in a few minutes, a sudden gloom fell upon them. In the *Times* of the 7th of September it was officially notified that an interruption of the electrical current had taken place; soon afterwards the signals became unintelligible, and in a day or two they wholly ceased. Scientific inquiry revealed the fact that the fault lay about 270 miles from Valentia, at the mountain range which divides the deep waters of the Atlantic from the shallows of the Irish coast.

Dr. Russell summarizes the results of the investigations instituted by the Company as follows: The causes of the failure were, first, that the cable had been manufactured too hastily; secondly, that a great and unequal strain was brought on it by the machinery; and, thirdly, that the repeated coilings and arrestings it underwent had served to injure it.

Whatever the causes, we cannot wonder that the failure, which involved a loss of half a million sterling, was productive of very general disappointment, and that many of the most strenuous promoters of the enterprise were sorely discouraged by it. While Mr. Field preserved his honest faith in its feasibility, others began to regard the scheme as chimerical; not, indeed, disputing that it was possible to *lay* the cable, but asserting that it could not be made to *work*. The directors of the Telegraph Company, however, after some hesitation resolved on an attempt to resume the work, if the necessary capital could be raised.

As a preliminary, an appeal was made to the British Government for help, which was so far successful that the subsidy was increased to £20,000 per annum, and a guarantee of eight per cent. for twenty-five years on a new capital of £600,000. At the same time the Government instituted a series of minute experiments in submarine telegraphy,—under the direction of Captain Galton, Professor Wheatstone, William Fairbairn, G. P. Bidder, C. F. Varley, Latimer and Edwin Clark, and G. Saward,—which proved of the highest value. After two years of the most complete investigation, these distinguished men reported (in 1863) that "a well-insulated cable, properly protected, of suitable specific gravity, made with care, and tested under water throughout its progress with the best-known apparatus, and paid into the ocean with the most improved machinery, possesses every prospect of not only being successfully laid, in the first instance, but may reasonably be relied upon to continue for many years in an efficient state for the transmission of signals."

Meantime Mr. Field was incessantly active in the prosecution of the work which was identified with his name. He crossed the ocean repeatedly, in order to interest in it the merchants of Great Britain and the United States, and to raise the large capital required. For years his progress was slow. Capitalists were daunted by the remembrance of the failure of 1858, and it seemed useless to remind them of the improvements in submarine telegraphy, and in the manufacture of electric cables, which had since been effected. But in 1863 Mr. Brassey, the great contractor, Mr. Gooch, Mr. Field, and Mr. Pender nobly came forward, and with Messrs. Glass and Elliot formed a new Company, which absorbed the old undertaking, and, under the title of "The Telegraph Construction and Maintenance Company," prepared to make another attempt to link the Old World to the New by the electric wire. A contract was made with the Telegraph Construction and Maintenance Company for the manufacture of a new and improved cable; and Brunel's colossal ship, the *Great Eastern,* was chartered for the purpose of laying it. Once more Mr. Field's cosmopolitan spirit had triumphed over difficulties which would have baffled and broken down a weaker man.

Every precaution was taken which could insure success.

First, as regards the cable, the scientific committee of which we have already spoken recommended:

That the conductivity of *the wire* should be fixed at a high standard—certainly not less than 85 per cent.; that the cable should be at least equal to the best ever made; that the *core* should be electrically perfect; that it should be tested *under hydraulic pressure,* and at the highest pressure attainable, in the tanks at the Company's works; that after this pressure the core should be examined again, and, before receiving its outer covering, be required to pass *the full electrical test under water;* that careful and frequent mechanical tests be made upon *the iron wire and hemp* as to their strength; that special care be given to the *joints,* where different lengths of cable were spliced together; and that, when completed, the whole be tested under water for some length of time, at a temperature of 75°—a temperature 40° higher than that of the Atlantic. And as the insulation of the electric fluid is improved by cold, it was obvious that if it remained perfect in this warm water, it could not fail in the icy depths of the ocean.

The reader will think, perhaps, that *all* this care was unnecessary. Does he not remember the maxim: Whatever is worth doing at all, is worth doing well? It matters quite as much *how* a thing is done, as *whether* it is done. Of this fact, unfortunately, the young are too often forgetful. They content themselves, for instance, with acquiring just so much knowledge of the subject of their day's lesson as will enable them to answer the master's questions. They do not trouble themselves to get possession of it thoroughly; to examine it on every side; to penetrate, as it were, to the heart of it; to trace its connection with the lesson of to-morrow and the lesson of yesterday. Alas! what is easily gained, is easily lost. For lack of thoroughness, days and years will be wasted; and the careless student will develop into the half-educated man.

Let us now examine the cable, on which so much anxious attention was bestowed, and see if we can in any way realize to ourselves what it *was*—its composition, its characteristics, its appearance.

In the first place, we notice that it differed in several particulars from the deep-sea cable of 1858.

Its central copper wire, the spinal cord or great nerve along which the mysterious lightning was to speak unseen and unheard, was nearly three times larger.

The old wire, or conductor, consisted of *seven* fine wires, six laid round one central, and weighed only 107 lbs. to each mile of cable.

The new was composed of the same number of wires as the old,—the perfect number, according to the fancy of old writers,*—but it weighed 300 lbs. to the mile, and was made of the finest copper that could be obtained.

To secure complete insulation, this conductor was first imbedded for solidity in a preparation impervious to water, called Chatterton's Compound, and then covered with four layers of gutta-percha, which were laid on alternately with four thin coats of the aforesaid compound.

The old wire had no external covering but gutta-percha in three coats; and its entire insulation did not weigh more than 261 lbs. to the mile, which, as we have seen, was largely exceeded in the new wire.

Figure to yourself this core, or inner cable of seven wires, with its outer covering of eight layers of gutta-percha and Chatterton's compound, and even then you have not got at the full measure of the Atlantic Cable. For the core of which we have been speaking was incased with ten solid wires of the best iron, or rather of a soft steel, like that used for Whitworth's cannon. These wires added greatly to the weight and strength; for whereas the old cable had weighed but 20 cwt. to the mile, the new one weighed 35¾ cwt.

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* A peculiar sanctity was supposed to attend the number *seven*. There were *seven* planets, *seven* gifts of the Holy Spirit, *seven* days of the week; and so on.

Thus we have—(1) the wires; (2) the coating; (3) the steel wires. But we have not yet done. Outside the iron or steel wires came a further coating of rope. *Each* wire was surrounded with five strands of stout Manilla yarn, soaked in a preservative compound; and the whole was laid spirally round the core, which latter was padded with ordinary hemp, also soaked in a preservative compound.

The usefulness of this rope covering, I must tell you, was very great. It prevented the wires from being rusted or corroded by coming in contact with the salt water; it greatly added to the solidity of the cable; and it also increased its flexibility, so that while it had all the strength of an iron chain, it was as light and flexible as a common ship's-rope.

This union of two qualities, we may observe, was all-important. The great problem had been to combine strength with flexibility. There was nothing to be gained from mere weight. It is possible to make a light thin wire capable of bearing greater pressure than a heavy bar of lead. The new cable, though nearly twice as heavy as the old *in air*, weighed, when immersed in water, but a trifle more; so that, in proportion to its *size*, it was really lighter. This increased lightness was a very important matter in laying the cable, as it caused it to sink slowly. The old cable, though smaller, was heavy almost as a rod of iron; so that, as it ran out, it dropped at an angle which exposed it to great danger in case of a sudden lurch of the ship. Thus, in 1857, it was broken by the stern of the *Niagara* being thrown up on a wave just as the brakes were shut down. Now the cable, being partially buoyed by the rope, would float out to a great distance from the ship, and sink down slowly in the deep water.

By this combination of rope and iron, the manufacturers had ingeniously constructed a cable two and a half times stronger than the old; the breaking strain of the latter having been 3 tons, 5 cwt., that of the former being 7 tons, 15 cwt. The reader may not clearly understand this somewhat technical language. Well, if the old cable had been laid in water *five* miles deep—the depth in some parts of the Atlantic—it would have snapped under the enormous pressure; but the new cable could be sunk in water more than *ten* miles deep, without any fear of its breaking.

Such was the result of the great care and thought bestowed upon its manufacture.

We have described the way in which the cable was made. As to its length, it measured no less than 2300 nautical, or nearly 2700 statute, miles. Clearly, neither the *Niagara* nor the *Agamemnon* could accommodate so enormous a bulk. Yet to stow one half in each ship had been found to increase the difficulties and dangers of the enterprise. Happily, there was *one* vessel in the world—and only one—which could take the whole on board; we mean the *Great Eastern*, that true leviathan of the deep, constructed by the genius of Brunel—

> "Hugest of all man's works
> That swim the ocean stream."

The Telegraph Company chartered this colossus of ships, manned her with a picked crew, and intrusted her, at the request of Mr. Field, to the charge of Captain James Anderson, who had acquired a distinguished reputation in the Cunard service. He was just such a man as I could wish every boy who reads these pages to become. He was gifted with considerable intelligence, and by his constant industry had acquired a vast fund of various information. His words were few, but always to the purpose; his manner was modest, his judgment clear. He was fertile of resource, and prompt in action. He was a man of a deeply religious spirit, and hence he was a man whose one object in life was to *do his duty.* Whatever the trust committed to him, he devoted all his thoughts, all his energies, all his time to its fulfilment. "Duty!" was the watchword of his life; as it is the watchword of every truly great and noble character.

The work of stowing away the cable on board the *Great Eastern,* where it was coiled up in three immense tanks,—one aft, one amidships, and one forward,—began in January, and was not completed till June. It will give the reader an idea of the enormous size and capacity of the *Great Eastern,* when we tell him that though the cable measured 2700 miles, a visitor to the mammoth ship was, at first, unaware of its being on board! Here is the account given by a lively writer who went to see the ship and its novel cargo. Its details are so interesting, that we are sure our readers will excuse the length of the quotation:—

"It is time," he says, after a general survey of the wonders of the huge vessel—"it is time we should look after what we have mainly come to see—the Telegraph Cable. To our intense astonishment, we behold it nowhere, although informed that there are nearly two thousand miles of it already on board, and that the remaining piece, which is long enough to stretch from Land's End to John o' Groats, is in course of shipment. We walk up and down on the deck of the *Great Eastern* without seeing this gigantic chain which is to bind together the Old and the New World, and it is only on having the place pointed out to us that we find where the cable lies."

The writer then describes the process of taking it on board:—

"On the side opposite to where we landed, deep below the deck of our giant, is moored a vessel surmounted by a timber structure resembling a house, and from this vessel the wonderful telegraph cable is drawn silently into the immense womb of the *Great Eastern.* The work is done so quietly and noiselessly, by means of a small steam-engine, that we scarcely notice it. Indeed, were it not pointed out to us, we would never think that that little iron cord, about *an inch in diameter,* which is sliding over a few rollers and through a wooden table, is a thing of world-wide fame,—a thing which may influence the life of whole nations; nay, which may affect the march of civilization.

"Following the direction in which the iron rope goes, we now come to the most marvellous sight...We find ourselves in a little wooden cabin, and look down, over a railing at the side, into an immense cavern below. This cavern is one of the three "tanks" in which the two-thousand-mile cable is finding a temporary home. The passive agent of electricity comes creeping in here in a beautiful, silent manner, and is deposited in spiral coils, layer upon layer. It is almost dark at the immense depth below, and we can only dimly discern the human figures through whose hands the coil passes to its bed. Suddenly, however, the men begin singing. They intone a low, plaintive song of the sea, something like Kingsley's—

"Three fishers went sailing away to the west,
Away to the west, as the sun went down"-

the sounds of which rise up from the dark, deep cavern with startling effect, and produce an indescribable impression.

"We move on; but the song of the sailors who are taking charge of the Atlantic Telegraph Cable is haunting us like a dream. In vain that our guide conducts us all over the big ship, through miles of galleries, passages, staircases, and promenades; through gorgeous saloons, full of mirrors, marbles, paintings, and upholstery, made 'regardless of expense;' and through buildings crowded with glittering steam apparatus of gigantic dimensions, where the latent power of coal and water creates the force which propels this monster vessel over the seas. In vain our attention is directed to all these sights; we do not admire them; our imagination is used up. The echo of the sailors' song in the womb of the *Great Eastern* will not be banished from our mind. It raises visions of the future of the mystic iron coil under our feet: how it will roll forth again from its narrow berth; how it will sink to the bottom of the Atlantic, or hang from mountain to mountain far below the stormy waves; and how two great nations, the offspring of one race and pioneers of civilization, will speak through this wonderful coil, annihilating distance and time. Who can help dreaming here, on the spot where we stand? For it is truly a marvellous romance of civilization, this *Great Eastern* and this Atlantic Telegraph Cable. Even should our age produce nothing else, [illegible] would be the triumph of our age."

The *Great Eastern* sailed from the Nore on the 15th of July. She had on board Mr. Cyrus Field, Mr. Gooch, M.P., Dr. Russell (the correspondent of the *Times*), Mr. S. Canning (the engineer), Professor Thomson, Mr. Varley, and Mr. W. Smith (the electricians); and she was accompanied by two steamships of war, the *Sphinx* and the *Terrible.*

She accomplished the voyage to Valentia in safety. The point of departure for the cable was fixed at Foilhommerum Bay, five or six miles from Valentia Harbour; and here, on the land, the shore-end was successfully laid. The following evening, Sunday—a day regarded as peculiarly auspicious by seamen—the *Great Eastern,* attended by the two men-of-war, set out on her westward progress. The sun was setting, and a broad stream of golden light was thrown across the smooth billows towards the bows of the three vessels, as if "to indicate and illumine the path marked out by the hand of Heaven!"

But happy as were the auguries, the course of the expedition was not destined to run smooth. Only a few hours had passed when the loud roar of a gun, the appointed signal, announced that a misadventure had occurred. The *Great Eastern* lay-to, and her electricians anxiously addressed themselves to the task of investigating the nature of the accident. The apparatus employed, called the *galvanometer*, was the invention of Professor Sir William Thomson, and is so constructed that a ray of light reflected from a tiny mirror suspended to a magnet travels along a scale, and indicates any resistance to the passage of the electric current through the cable by the deflection of the magnet, this deflection being indicated by the course of the ray of light. Should the light travel beyond the index, or out of bounds, an escape of the current is taking place, and what is technically called "a fault" has occurred.

The injury proved not to be a fatal one, and signalling could still be continued, but the electric current did not flow freely, and it was indispensable that the leak should be stopped. Eighty-four miles of cable had been paid out, and the ship was seventy-three miles from shore. The tests applied by the electricians, however, showed that the fault did not lie more than ten or twelve miles from the stern of the ship. What was to be done? Go back that distance, or whatever distance might be necessary, pick up the cable, and cut out the defective portion. It had been anticipated that some such accident might occur, and the *Great Eastern* was provided with suitable machinery for "picking up." The operation, however, was laborious, difficult, and slow. With all the energy and good will of the men engaged, it was impossible to raise more than a mile an hour.

All during the night, says Dr. R[illegible]ell, the process was carefully carried on, the big ship behaving beautifully, and hanging lightly over the cable, as if fearful of breaking the slender cord which swayed up and down in the ocean. Indeed, so delicately did she answer her helm, and coil in the fibre of thread-like cable over her bows, that she put one in mind of an elephant taking up a straw in its proboscis. When a little more than ten miles of cable had been hauled in, the fault was discovered: a small piece of wire, not longer than a needle, which by accident, or, it is suspected, by design, had been driven through the external coating of the cable till it touched the core. This was the cause of all the mischief,—carrying off the electric fluid, which should have continued its equable progress along the cable.

The wire was quickly removed; the injured piece of c[illegible] off; a splice made; and the work resum[illegible]

Once more the *Great Eastern* turned her mighty prow towards the sunset, and proceeded on her stately way. All went well until the 29th, when, a little after noon, a new cry of alarm was raised. And well it might be, for the insulation was completely destroyed, and the electric current overflowing uselessly into the sea!

As the faulty piece had gone overboard, it was necessary once more to reverse the vessel's course and haul in the cable until the defective part was recovered. This was a difficult task, for they were in water two miles deep. Difficulties, however, did not daunt the pioneers of this great enterprise, and after working all the afternoon, the injured cable was got on board about ten o'clock at night. It was at once stowed away; and the next morning, Sunday, was welcomed with an eager feeling of relief and delight, after the suspense of the preceding four-and-twenty hours.

On Monday, the miles of cable which had been hauled up, and were coiled in huge heaps upon the deck, were closely examined, to discover the origin of the mischief. This was soon detected

Near the end a piece of wire was thrust through the very core, as if driven into it. The recurrence of such a mishap actually suggested suspicions of treachery. It was observed that the same gang of workmen were in the tank as at the time of the first fault. Mr. Canning sent for the men, and showing them the cable and the wire, asked for an explanation. All replied that it must have been done intentionally, and regretted that there was a traitor among them—the unknown traitor, of course, being one of those who thus expressed their sorrow! It seemed difficult to believe that any person could be base enough to plot in this stealthy way against the success of a beneficent enterprise, but such a thing had been done before in a cable in the North Sea, when the perpetrator of the crime was discovered and punished. In the present case there were not wanting motives to prompt the commission of such an act. The fall in the stock, we are told, on the London Exchange, caused by a loss of the cable, could hardly be less than half a million sterling. Here was a temptation such as betrays bold, bad men into crime. However, as it was impossible to fix the deed on any one, nothing was proved: the instigator and the perpetrator both remained unknown; but, of course, a painful feeling of suspicion was left in the minds of Mr. Field and his colleagues. They saw that they must be on their guard; and it was agreed, therefore, that the gentlemen on board should take turn in keeping watch in the tank.

The *Great Eastern* continued her voyage, and for three days, during which they accomplished five hundred miles, no further trouble occurred. Mr. Field, as well as his associates, now enjoyed a sense of coming triumph. Everything looked favourable; Heaven seemed to smile on the undertaking. The ship, apparently, had been destined by Providence to accomplish this special mission. The paying-out apparatus might have moved the enthusiasm of the most stolid engineer, so smoothly did its oiled wheels run. Never, even in the greatest depths of the Atlantic, did the strain upon the cable exceed fourteen hundredweight. And as for the cable itself, everybody was prepared to avow that it was perfection. Its insulation was improved by submergence in the ocean. With every lengthening league, better it grew and better. The fact may seem almost incredible, but is most satisfactorily attested, that when in mid-ocean the communication was so perfect that the officials at Valentia could tell every time the great ship rolled. With such omens of success, one might be pardoned for feeling confident. And when on Monday they sailed over the deep dark Atlantic valley, where lay the remains of three deep-sea telegraphic cables, all rejoiced in the thought that they, at least, would not be fated to add another to their number!

But on Wednesday "a change came o'er the spirit of the scene." About twelve hundred miles of cable had been run out, and the ship was within two hundred leagues of her wished-for goal. Five days more, and the long suspense would be at an end. Every heart was hopeful; the most timorous had put aside their fears. Alas, we are often most confident when we are nearest to some sudden misfortune! And so it proved on board the *Great Eastern.* In the morning, while the indefatigable Mr. Field was mounting guard in the tank, with the same gang of men who had been working there on the occasion of the previous accident, a grating sound struck upon his ear, just as if a piece of wire had become entangled in the machinery. Word was immediately passed up to the deck to look out for it; but the caution seems not to have been heard, and the defective cable passed over the ship's stern.

Shortly afterwards the unerring galvanometer revealed the existence of a fault, and that, instead of traversing the whole length of the cable to the shore, a portion of the electric fluid was escaping through the gutta-percha into the sea.

The mishap was not only serious, but it was necessary to remedy it; and arrangements were made for hauling in the cable. Unfortunately, the "picking-up" machinery was not sufficiently powerful, and the "donkey-engine" which set it in motion soon gave out for want of steam. While waiting for this, a fresh breeze sprang up, causing the *Great Eastern* to drift a little. In drifting, she tugged at the cable, which chafed against her bows with considerable friction; so that when the hauling-in process recommenced, the injured portion proved unable to bear the strain, and, in coming up over the wheels, snapped right asunder! With one bound the cable flew through the stoppers, leaped over the intervening space, and plunged deep into the sea!

The shock of the instant, says Dr. Russell, was as sharp as the snapping of the cable itself! Words cannot describe the bitterness of the disappointment. The cable gone! gone for ever down in that fearful depth! It was enough to move one to tears; and when a man came with the piece of the end lashed still to the chain, and showed the tortured strands, the torn wires, the lacerated core, it is no exaggeration to say that a feeling of pity—as if it were some living creature which had been thus mutilated and torn asunder by brutal force—awoke in the heart of every spectator.

The ship was then 1062 miles from Valentia, and 606 miles from Heart's Content (in Newfoundland); lat. 51° 25′ N., long. 39° 6′ W.

What was to be done? It was useless to stand looking on with folded arms and sad countenances. No danger or difficulty is made less by *thinking* over it; help or relief is to be found only in action.

Action! yes. But in what direction?

After a brief consultation between Mr. Field, Mr. Canning, and others, it was determined on making an attempt to recover the cable.

To most persons on board the idea seemed as Quixotic as to attempt to search out the secret of the philosopher's stone or the mystery of perpetual motion, but still it was felt to be the right thing to do. What would they say in England, if they returned without a single effort to repair the mischief that had been done? It was settled, therefore, that the *Great Eastern* should steam to windward and eastward of the position she occupied when the cable went down, lower a grapnel, and slowly drift across the track in which the lost treasure was supposed to be lying.

So the big ship stood away some thirteen or fourteen miles, and there lay-to in smooth water. The grapnel, two five-armed anchors, with flukes sharply curved, and tapering to an oblique tooth-like end—"the hooks with which the giant Despair was going to fish from the *Great Eastern* for a take worth, with all its belongings, more than a million sterling"—were brought up to the bows. One of these, weighing three hundredweight, shackled and secured to wire rope, of which there were five miles on board, was thrown over, and, whistling as it went, leaped down into the sea.

At first, says Dr. Russell, the iron sunk slowly; but soon the momentum of descent increased, so as to lay great stress on the picking-up machinery, which was rendered available in lowering the novel messenger with warrant of search for the fugitive hidden in mysterious caverns beneath.

"Length flew after length, over way-wheel and drum, till the iron, warming with work, heated so as to convert the water thrown upon the machinery into clouds of steam. The time passed heavily......The drums beat no more; their long reveille ended in the muffled roll of death; that which had been broken could give no trouble to break, and man shunned the region where all these mute witnesses were testifying to the vanity of human wishes. All life died out in the vessel, and no noise was heard except the dull grating of the wire-rope over the wheels at the bows. The most apathetic would have thought the rumble of the cable the most grateful music in the world."

Away slipped the rope, yard after yard, fathom after fathom; Ocean, like the horse-leech's daughters, still crying for "more," and "more" still descending into the black waste of waters. One thousand fathoms—still more! One thousand five hundred fathoms—more, still more! Two thousand fathoms—more, still more! Two thousand five hundred fathoms (15,000 feet)—ay, that will do; the grapnel has reached the bed of the Atlantic; the search has begun.

And all night long it continued.

Men had begun to lose heart; to shake their heads and mutter, "We knew it was of no use;" when, towards morning, the long rope quivered like an angler's line when a fish has seized his cunningly-baited hook, and the giant bows of the *Great Eastern* swerved from their direct course, as if compelled by some unseen attraction! All hands to haul in! And as they hauled, they became aware, from the rapidly increasing strain, that the grapnel had certainly got hold of *something*. What can it be? How can they tell that it is the lost cable? May it not be some mast or spar, some enormous skeleton of ocean-monster, some one or other of those countless waifs and strays with which Fancy loves to picture the bed of Ocean as plentifully strewn? The question is easily answered. Were it any loose object coming up from those silent incommunicable depths, its weight would *diminish* as it rises. But, on the contrary, the dynamometer shows that the strain steadily *increases*, and this must necessarily be due to some object lying prone on the bottom.

At noon nearly half a mile of rope was gathered in, and with every length of cable drawn up from the sea, the spirits of all on board grew lighter;

and though they still talked of risks and difficulties, there was an inward confidence that, having caught up the cable in so extraordinary a manner, they were fated to haul it in successfully, and accomplish their mission by landing it triumphantly at Heart's Content. And so for hours they toiled on merrily. But when they had raised it seven hundred fathoms, or three-quarters of a mile, from the bottom, an iron swivel gave way, and fourteen hundred fathoms of line, with grapnel attached, swept down again through the remorseless waters of the Atlantic, carrying with it the cable!

We need not attempt to depict the mortification which Mr. Field and his colleagues experienced. But they were not wholly disheartened. They resolved, like brave men, to try again; and they were encouraged to do so by the partial success which had attended their first attempt. Preparations were commenced without delay, but the work was delayed by a succession of mists and fogs until Monday. Then, through skilful seamanship, the *Great Eastern* was carried over the track of the buried cable, and the grapnel, with two thousand five hundred fathoms of wire-rope attached to it, resumed its search. It caught again.

It was late in the afternoon when it seized upon the treasure, and the work of hauling in went on all night. The sea, however, was as tranquil as a woodland pool, the moon shone down from a cloudless heaven, and all joined in the toil with hearts elate, confidently hoping to triumph on the morrow.

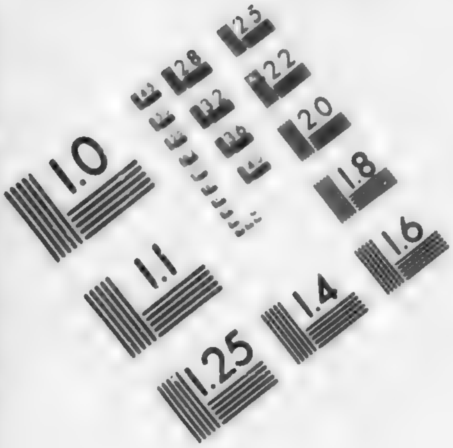
It was not to be; but each effort seemed to come nearer and nearer to success. This time the cable was drawn up fully a mile from the bottom, and hung suspended a mile and a half below the ship. Had the rope been strong enough, there is no doubt it might have been brought on board. But again a swivel gave way, and again the cable returned to its resting-place among the "salt sea ooze."

These experiments had used up a considerable quantity of the wire-rope, and every expedient had to be adopted to piece it out and increase its strength. Each shackle and swivel was replaced by new bolts, and the capstan was enlarged four feet in diameter, by the addition of huge rings of iron, so that the rope might be coiled around it if the picking-up machinery should fail. This gave full work to the mechanics on board. The spectacle presented was one which only a

Rembrandt could have rendered successfully upon canvas. "The forge fires," says Dr. Russell, "glared on the decks of the great ship, and there, out in the midst of the Atlantic, anvils rang and sparks flew; and the spectator thought of some village far away, where the blacksmith worked, unvexed by cable anxieties and greed of speedy news. As the blaze shot up, ruddy, mellow, and strong, and flung arms of light aloft and along the glistening decks, and then died into a red centre, masts, spars, and ropes were for the instant touched with a golden gleaming, and strange figures and faces were called out from the darkness—vanished, glinted out again—rushed suddenly into foreground of bright pictures, which faded soon away—flickered, went out—as they were called to life by its warm breath, or were buried in the outer darkness! Outside all was obscurity, but now and then vast shadows, which moved across the arc of the lighted fog-bank, were projected far away by the flare; and one might well pardon the passing mariner, whose bark drifted him in the night across the track of the great ship, if, crossing himself, and praying with shuddering lips, he fancied he beheld a phantom ship freighted with an evil crew, and ever after told how he had seen the workshops of the *Inferno* floating on the bosom of the ocean."

While making ready for a third attempt, the *Great Eastern* had drifted to and fro, sometimes to a distance of thirty or forty miles, but the track of the cable had been marked by a couple of buoys, lying about three leagues apart, and each carrying a flag visible afar off. On Thursday morning all was ready; the two buoys were sighted; the grapnel was thrown over; and 2460 fathoms of rope and hawser were paid out in three-quarters of an hour. But after some hours of expectation, the grapnel did not "bite," and it became evident that the ship had passed over the course of the cable. The line was hauled in, and the cause of the failure immediately detected. It was impossible for the grapnel to have caught the cable, because, either in going down, or in dragging at the bottom, the chain had caught round one of the flukes.

It was now a dead calm, and the undaunted Canning and the indefatigable Field—the man of science, and the man of enthusiasm—prepared for a fourth and final effort. The wire-rope was overhauled, and stray hawsers were collected from every corner of the vessel. The previous trials,



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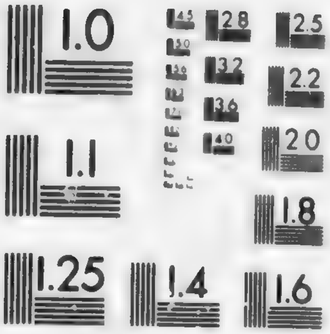

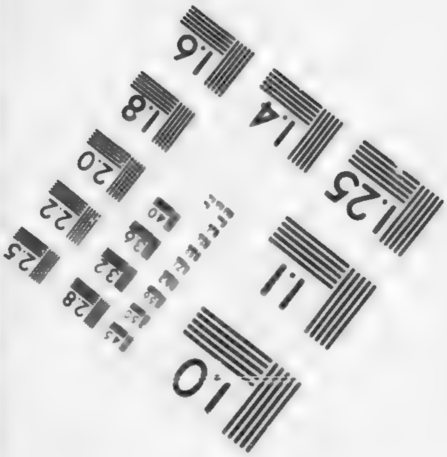

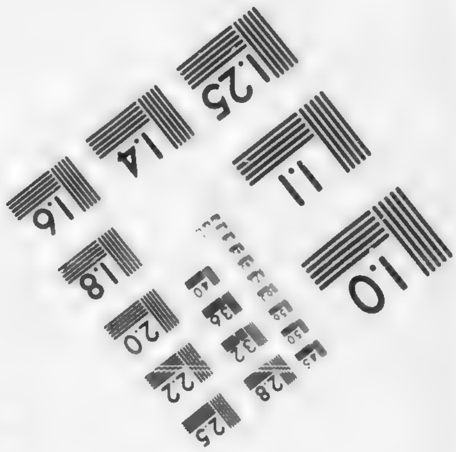

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with far better appliances, had, it is true, proved unsuccessful; the remaining tackle was "a thing of shreds and patches;" but these men felt it was their duty to hazard another attempt, and under whatever discouragement duty *must* be done! It was regarded as satisfactory that the ship was then in 1950 fathoms of water only. A grapnel with a shorter shank was selected for the coming trial. The cablemen were set to work to coil down the new rope and hawsers within a circular inclosure, formed by uprights on the deck behind the capstan. The rope which had been already used was examined, and repaired. Bolts and shackles were tested: in a word, nothing was left undone that skill and experience could suggest.

The line now employed consisted of 1600 fathoms of wire-rope, 220 fathoms of hemp, and 510 fathoms of Manilla hawser—in all, 2330 fathoms; of which, however, only 1760 fathoms could be trusted. The rest was "suspicious."

At about 2 P.M., the ship having regained her original position, the grapnel was again let go, and soon reached the bottom.

At 3.30 P.M., a considerable strain on the line was apparent, and the *Great Eastern*, by the uneasy shifting of her head, showed signs of feeling a restraint on her motions from below.

At last, it was evident that the cable had been caught, and the excitement on board the great ship became intense; men watching every movement of the line with as much anxiety as they could have watched the life and death struggles of their dearest relatives!

What alternations of hope and fear, says one who was an eye-witness of the scene, what doubts, what sanguine dreams, dispelled by a moment's thought, only to revive again! What need to say how intense was the general agitation? There was in every breast that deep yet repressed emotion with which we all await the utterance of some supreme decree, final and irrevocable! The ways were various in which men strove to disguise and subdue their excitement. We are told that some remained below in the cabins with their eyes fixed upon books of which they did not read a word, or their fingers listlessly employed in extracting fitful snatches of melody from piano or violin. Others went aft to the vast wilderness of deck, where all was lifeless and silent, and whence the iron oasis had departed. Many walked to and fro in the saloon; others paced the deck amidships, their measured march by no means in accordance with their feverish restlessness and mental tumult! None dared to venture forward, for every jar of the machinery, every shackle that passed the drum, every clash or clank, smote upon their hearts like the death-shriek. Mr. Field's emotions it is vain to attempt to describe. He had been, as we know, the heart and soul of the enterprise: it was owing to his perseverance that it had been carried out thus far; and now he waited, in voiceless anxiety, to see whether a further demand would be made upon his patient energy, or whether, after many trials, his efforts would be crowned with a full and consummate success. So it came to pass that about noon 500 fathoms of wire-rope had been hauled in, and men felt as if they might dare to hope. Once more the words "Heart's Content" and "Newfoundland" passed from lip to lip. And still the work went on, and up from the black depths of the waters came fathom after fathom of line. A few hours more, and——

The evening was dark and chill. Dr. Russell tells us that at 6.30 he left the saloon, and walked up and down the deck, under the shelter of the paddle-box, glancing forward now and then to the bow, to look at the busy crowd of engineers, sailors, and cablemen gathered round the rope coming in over the drum, which just rose clear of one of the foremasts, and listening to the warning shouts as the shackles came inboard and hurtled through the machinery till they floundered on the hurricane-deck.

"About twenty minutes had elapsed," says Dr. Russell, when I heard the whistle sound on the bridge, and at the same time saw one of the men running aft anxiously. 'There's a heavy strain on now, sir,' he said. I was going forward when the whistle blew again, and I heard cries of 'Stop it!' or 'Stop her!' in the bows, shouts of 'Look out!' and agitated exclamations. Then there was silence. I knew at once all was over. The machinery stood still in the bows, and for a moment every man was fixed, as if turned to stone. There, standing blank and mute, were the hardy constant toilers, whose toil was ended at last. Our last bolt was sped......The battle was over! Nigh two miles more of iron coils and wire and rope were added to the entanglement of the great labyrinth made by the *Great Eastern* in the bed of the ocean."

For nine days the struggle had been heroically continued, and now there was no more to be done. The attempt, so far as the year 1865 was concerned, must be given over. Yet the defeated retired from the battle-field with something of the exultation of conquerors; for in all their protracted labours the *cable* had never broken, and it was more and more evident that Mr. Field's enterprise was no poetic dream, but a reality, which under fairer circumstances could not fail to be successfully developed.

[It was proved by the expedition of 1858 that a submarine telegraph cable could be laid between Ireland and Newfoundland, and messages transmitted through the same.

By the expedition of 1865 it was proved that the insulation of a cable is greatly improved by submersion in the cold deep water of the Atlantic, and that its conducting power is also considerably increased.

That the steam-ship *Great Eastern*, from her magnitude and steadiness, and from the control over her which the joint use of paddles and screw afforded, rendered it safe to lay down an Atlantic cable in any weather.

That in a depth of over two miles four attempts were made to pick up the cable. In three of them the cable was caught by the grapnel, and in the other the grapnel was fouled by the chain attached to it.

That the paying-out machinery used on board the *Great Eastern* worked perfectly, and could be confidently relied on for laying cables across the Atlantic.

That with the improved telegraphic instruments for long submarine lines, a speed of more than eight words per minute could be obtained through such a cable as the then

Atlantic between Ireland and Newfoundland, as the amount of slack [loose cable] did not exceed fourteen per cent., which would have made the total cable laid between Valentia and Heart's Content nineteen hundred miles.

That the recent Atlantic cable, though capable of bearing a strain of seven tons, did not experience more than fourteen hundredweight in being paid out into the deepest water of the Atlantic between Ireland and Newfoundland.

That no difficulty was found in mooring buoys in the mid-ocean; and that two buoys, even when moored by a piece of the Atlantic cable itself, which had been lifted from the bottom, had ridden out a gale.

That a length of cable exceeding four nautical miles had been recovered from a depth of over two miles, and that the insulation of the gutta-percha covered wire had proved to be uninjured by the depth of water or the strains to which it had been subjected by lifting and passing through the hauling-in apparatus.

That the cable of 1865—this is a noteworthy fact—owing to the improvements effected in the manufacture of the gutta-percha core, was more than *one hundred times* better insulated than cables made in 1858, then considered perfect, and still in operation.

That it was possible to conduct the electrical testing with such delicate accuracy as to discover the existence of a fault immediately after its production or development, and very quickly to ascertain its position in the cable.

That with a steam-engine attached to the paying-out machinery, it was possible, should a fault be discovered while the cable was being laid, to recover it [the cable] before it had reached the bottom of the Atlantic, and to repair it immediately.]

These may seem "dry" details to the young reader, but they are absolutely needful if he would understand the vast progress which Mr Field's enterprise had made since he had first conceived its idea. It had passed out of the region of possibility into that of fact. It was no longer the dream of an enthusiast ; it was a reality. It had been *proved* that the electric wire could be laid "fathoms deep," and carried under water for hundreds of miles, without any injury to its conductive properties. And everybody looked forward with confidence, notwithstanding the misadventures which had occurred, to the day when communication between the Old World and the New would be simply a matter of minutes.

To what was due this astonishing measure of success ? After paying all honour to the inventive skill of such men as Canning, and Varley, and Sir William Thomson, and to the manufacturing skill of Glass and Elliot; after acknowledging the liberal and ready co-operation of such men as Brassey, and Pender, and Gurney,—it must be owned that the final triumph of the Atlantic Telegraph was won by the energy and enthusiasm of Cyrus Field. Twelve of the best years of his life, the whole of his private fortune, his best mental and physical faculties, had all been generously devoted to the accomplishment of this great work. No failures had daunted, no difficulties discouraged him. He had risen superior to fortune; each fresh trial had seemed to endow him with new strength. It would be difficult to find a more striking example of resolute perseverance, supported by a buoyant confidence and sanguine hopefulness; it would be difficult to find a more striking example of what such perseverance may achieve. If the reader is ever cast down by any temporary trouble, or oppressed by any sudden cloud; if he feels his heart giving way within him, because the fair promise of his youth seems never to be realized; if he shrinks before the rude onset of the world, and quails before each obstacle which rises in his path, let him think of Cyrus Field and his noble labour,—let him remember the success which finally crowned it,—and gain new courage, new hope, new ardour from such an example of patient heroism prevailing over every obstacle and disaster. There is little which Fortune will not yield to the quick brain and ready hand of Industry.

But remember, too, that Field was actuated by no sordid motive. He was inspired by no hope of enormous gains, but by an unselfish longing to do something for the welfare of humanity. It was not for individual profit, nor to gratify any ambitious aspirations, that he toiled, but in the interests of civilization, brotherhood, and peace. Here, again, the reader may learn something from Cyrus Field. Let him take care that his life is not a selfish life; that he does not live for himself alone; that he does not work for himself alone; but that his life and his work, either directly or indirectly, may promote the happiness and wellbeing of others. Then may he press forward with a hopeful heart, in full assurance of the help of Heaven!

On the return of the expedition to England, no abatement was observed of the public confidence in the eventual success of Mr. Field's great enterprise. On the contrary, it was felt that *one* cable was not enough; that thenceforth there must be *two* cables: and so it was resolved, not only to raise the broken end of the old cable, repair it, and complete it to Newfoundland, but also to construct a new one, and lay it, that a double line might be in operation in the following summer.

Of course, additional capital was wanted. Money is said to be the sinews of war; and when Man is carrying on a campaign, as it were, against Nature, a campaign against the powers of the deep, there can be no question that it will not do to count the cost. Money *must* be forthcoming. And in this case it *was* forthcoming. Mr. Brassey again came forward, with his inexhaustible resources; so did Gooch, and Barclay, and Campbell, and Pender, and Glass, and many others; and ultimately a new association was formed, under the style and title of the Anglo-American Telegraph Company, with a capital of £600,000, which contracted with the old Atlantic Telegraph Company, on certain conditions, to manufacture and lay down a cable in the summer of 1866. Towards this capital *ten* subscribers contributed each £10,000; namely,—

HENRY FORD BARCLAY.
HENRY BEWLEY.
THOMAS BRASSEY.*
A. H. CAMPBELL, M.P.
GEORGE ELLIOT.
CYRUS W. FIELD.
RICHARD ATWOOD GLASS.
DANIEL GOOCH, M.P.
JOHN PENDER, M.P.
JOHN SMITH.

There were four subscriptions of £5000—namely, Thomas Bolton and Sons, James Horsfall, a friend of Mr. Daniel Gooch, and Messrs. John and Edwin Wright; one of £2500, by John Wilkes and Sons; three of £2000, by C. M.

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* Who offered, if necessary, to increase his contribution to £60,000.

Lampson, J. Morison, and Ebenezer Pike; and two of £1000, by Edward Cropper and Joseph Robinson.

Thus, £230,560 were subscribed privately, before even a prospectus was issued. Is it any wonder that, when the books were thrown open to the public, the remainder of the capital was furnished in fourteen days?

On the 1st of March the manufacture of the new cable was begun, and in four months it was ready. Some minor but not unimportant improvements were introduced. The iron wires were *galvanized*; which protected them from rust, and enabled them to dispense with the preservative mixture formerly employed. The process, at the same time, rendered them more ductile, much lighter, and capable of bearing a greater strain.

The machinery, also, was perfected in every detail; and engines of greater power were constructed to work it. As for the testing apparatus, it was wrought up to a delicacy and an exactness which are almost incredible. It could and can reveal faults of the utmost minuteness; ay, even when they are so small that they would not weaken the signals through the Atlantic Cable *one millionth part.*

Meantime the *Great Eastern* was prepared for its share in the glorious enterprise. The two hundred and seventy miles of old cable left on board were found to be in admirable condition; and it had been ascertained, by numerous experiments, that the twelve hundred and thirteen miles at the bottom of ocean were also intact. The leviathan ship, still under the command of Captain Anderson, was thoroughly cleansed and repaired. She was also equipped with an infinite variety of grapnels, chains, and ropes; while every day, as the new cable was manufactured, twenty miles of it were safely received and coiled on board.

At noon, on the thirtieth day of June, she left her moorings in the Medway, and, with her precious freight, steered for the south-west coast of Ireland.

CHAPTER V.

FINIS CORONAT OPUS.

THE shore-end of the new cable was carried by a powerful two-thousand-ton ship, the *William Corry,* which arrived off Valentia Harbour on the morning of Saturday, July 7th, and immediately began to lay it. This shore-end was of huge size, weighing twenty tons to the mile, and was to be brought off on a bridge of boats reaching from the ship to the foot of the cliff. For this purpose all the fishing-boats along the coast were hired, and H.M.S. *Racoon* sent up her boats to help; so that, when arrayed in line, there were forty of them, forming a very fine and extensive pontoon. All worked well, and by one o'clock the cable was landed, and the *William Corry* slowly stood out to sea, keeping westward, until she had laid the entire length of thirty miles which she had on board.

On Friday morning, July 13th, the *Great Eastern* and her consorts finally took leave of the Irish coast. The great ship hauled up the cable from its ocean-bed, and, splicing it to the colossal rope on board, began its eventful voyage. The weather was fine, and every omen auspicious—best omen of all being the noble energy and confidence with which every heart was filled. On Saturday, too, the skies shone, and the waves glanced and glittered, and the wind blew gently. On Sunday—but here we take up the record of Mr. Deane, who was on board the *Great Eastern*, and kept a "Diary of the Expedition."

Sunday, July 15.—All through yesterday, writes Mr. Deane, the paying-out machinery worked so smoothly, the electrical tests were so perfect, the weather was so fine, that everybody felt sanguine of the ultimate result. The recollection, however, of the reverses of the expedition of 1865 was always present to those who had the greatest reliance on success; and there was a quiet repose about the manner of the chief practical men on board, which showed they would not allow themselves to be carried away by the smoothness of twenty-four hours' events.

Monday.—Still everything went well. The sea was as smooth as a mill-pond. The paying-out of the cable progressed with uniformity and steadiness, and all the electrical tests worked perfectly. The average speed of the *Great Eastern* measured about five knots per hour.

Tuesday.—Our journalist records another twenty-four hours of uninterrupted success. All day yesterday, he writes, it was so calm that the masts of the convoy were reflected in the ocean, as if its surface were as smooth and glassy as that of a sequestered mountain-tarn. A large shoal of porpoises amused the voyagers with their gambols. A glorious sunset was followed by the rising of the crescent moon, unclouded.

A striking change, however, was at hand. Suddenly the tranquil blue of the heavens was overcast; heavy clouds gathered up rapidly from the horizon; the breeze swelled into a furious gale. Then occurred the only serious incident of the voyage. While the rain fell in torrents, and the fierce wind whistled through the rigging, the conductors of the enterprise were frightened out of their composure by what proved to be a very sufficient cause of alarm.

A foul flake took place in the after-tank.

Immediately the engines were turned astern, and the paying-out of the cable stopped. All were soon on deck, to learn that the running or paying-out part of the coil had caught three turns of the flake immediately beneath it, had carried them into the eye or centre of the coil, and produced a considerable and dangerous entanglement. Fortunately, the coil was prevented from interfering with the paying-out machinery. The buoy was let go, to mark the position of the cable, if necessary, and Mr. Canning then proceeded to superintend the disentanglement of the confused heap. In the midst of thick rain and increasing wind, to unthread, as it were, a coil of 500 feet of rope, was no easy task. However, with immense patience, care, and labour, it was accomplished successfully, and soon after two A.M. the paying-out process was resumed.

Wednesday.—A fresh breeze blew from the southward; the sky was dull and gray; the sea slightly perturbed; and some rain fell occasionally.

Thursday.—In the afternoon a fresh breeze blew, which increased toward evening. The heavy swell on the port-quarter caused the ship to roll. Still the paying-out went on steadily.

The sun sank with an angry look, and the scud came rapidly from the eastward, accompanied by a rising sea. The swell was very heavy, and the *Great Eastern* proved herself not insensible to it. Her rolling, like everything else appertaining to her, was done on a grand scale.

Friday.—On this day Mr. Deane writes, with enthusiastic recollections:—

Yesterday was a day of complete success, the paying-out in every respect satisfactory. The wind still blew from the eastward, but with a northward inclination. As Mr. Canning told us we should see the after-tank emptied at eleven o'clock, ship's time, we were all collected there about ten o'clock, by which time the cable was down to the last flake. Next to having daylight for changing from the after to the fore tank, we could not have had a more favourable time—clear starlight, no wind, and a smooth sea. Looking down into the tank, the scene was highly picturesque.

The cable-watch, whose figures were lighted up by the lamps suspended from above, slowly and cautiously lifted the turns of the coil to ease their motion. As each found its way to the drum, the wooden floor of the tank became visible,—and more and more floor,—and as its area widened, the cable swept along its surface with a low, subdued noise, until, with a graceful curve, it mounted to the outlet, where it was soon to join a fresh supply. And now the word is passed that they have reached the last turn, and the men on the platform above watch the arrival of the cable closely, and pass it up with tender caution until it reaches the summit; then it rushes down a wooden incline to meet the spliced rope, which had by this time come down along the trough leading from the forward tank. At eleven minutes past one A.M. the fresh rope was going over the stern, and the screw engines moving ahead at thirteen minutes past one. A watch of four men was then stationed, fore and aft, all along the trough, which was illuminated by many lamps at short distances from each other. A lamp with a green light indicated the mile-mark as it came up from the tank; the signal being repeated until it reached the stern, where it was duly recorded by the clerk who kept the cable-log,—the current history, so to speak, of the electric wire. A red lamp was the signal for danger. During the day-time red and blue flags were used instead of lamps.

Saturday.—This morning the sea was comparatively smooth, and blue rifts of sky broke through the dispersing clouds. The great ship steadily continued her westward march, and mile after mile of cable was safely deposited in the depths of ocean.

Sunday, July 22nd.—Still all went well. The day was bright and clear, with a fresh breeze from the north-west. The cable ran out with unerring smoothness, at the rate of six miles an hour. Signals from Valentia came regularly and distinctly, so that the voyagers in the *Great Eastern* were fully supplied with intelligence of all that transpired in England or on the Continent,—then convulsed by the sharp, brief war in which Prussia humbled the military pride of Austria. Between six and seven P.M. the *Great Eastern* crossed the deepest part of her course, but the cable continued to run out with its accustomed regularity.

Monday.—At a quarter to twelve A.M. only 215 miles of cable remained in the fore-tank. Thirty hours would see this paid out; then for a small supply from the main-tank, and then—but we must not anticipate.

Tuesday—The weather grew thick and hazy as the monster vessel approached the banks of Newfoundland, but no interruption took place in the paying-out process.

Wednesday.—A deep fog brooded on the waters, and the expedition steered cautiously towards its goal. At fifty-two minutes past one, Greenwich time, or forty-five minutes past ten P.M., Tuesday, according to ship's time,—the difference arising from the difference in longitude,—the fore-tank being nearly empty, preparations were made for splicing the end of its cable to the end of the section in the main-tank. In seven or eight minutes these were completed, and at thirty-five minutes past two the paying-out process was resumed.

Thursday.—Soundings being taken, the *Great Eastern* was found to have got so near her destination that the depth of water was only 130 fathoms.

Here we may present the reader with a table showing the number of miles which the *Great Eastern* accomplished daily during this memorable voyage, and the length of cable paid out daily. It is interesting, because it points to a remarkably uniform rate of progress, and to a singular regularity of work. "From day to day," seems to have been the motto of all engaged; continuous, well-ordered labour, and not fitful and exhausting efforts, followed by unprofitable pauses.

Date.	Distance Run in Miles.	Cable Paid Out (Miles).
Saturday, July 14,	108	115
Sunday, July 15,	128	139
Monday, July 16,	115	137
Tuesday, July 17,	117	138
Wednesday, July 18,	104	125
Thursday, July 19,	112	129
Friday, July 20,	117	127
Saturday, July 21,	121	136
Sunday, July 22,	123	133
Monday, July 23,	121	138
Tuesday, July 24,	120	135
Wednesday, July 25,	119	130
Thursday, July 26,	128	134
Friday, July 27,	100	104
	1633	1820

On Friday, July 27th, the *Great Eastern* reached Heart's Content in safety, and the problem of telegraphic communication between Europe and America was happily solved. It was a great work done; a glory to our age and nation; an immortal honour to the men who did it,—men thenceforth to occupy a high rank among the most illustrious benefactors of their race.

That same afternoon, we are told, as soon as the shore-end was securely landed, Mr. Field and the officers of the expedition repaired in a body to the little church in Heart's Content, there, by offering up their thanks to the God of Peace, fitly to solemnize a work planned in the interests of peace, international unity, and goodwill. A sermon was preached on the text—"And there was no more sea" (Rev. xxi. 1); and all joined in the noble prayers and thanksgivings of the English Liturgy. So the voyage ended as it had begun. The little armada of science and civilization sailed from the shores of Ireland with prayers wafted after it,—prayers for its quick and complete success in its struggle against the elements. And now, on the shores of the New World, the struggle happily concluded in victory. Mr. Field and his companions, like Columbus, felt it their first duty to offer up prayer and praise to that Almighty Being who holds the waters in the hollow of his hand, and who had conveyed them safely across the mighty deep.

All work, all honourable work, which is worth doing at all, is worth doing with prayer; prayer when it is begun, prayer during its progress, and prayer when it is ended. For so shall *it* receive the blessing of our Father who is in heaven; and so shall *we* receive the strength necessary for its proper accomplishment; and so shall we know that it is a good work, which shall never be weighed in the balance and found wanting. You know, perchance, the old monkish adage, *Laborare est orare*—Work is prayer. It would read better if we wrote it, *Labora et ora*—Work and pray. Be sure of this, that the work on which we fear to invite God's blessing,—the work in which we fear to supplicate His assistance,—is work which it were best we should never undertake. And hence we may carry with us through life as one unchanging and ever appropriate principle, *Never do aught which we cannot first commend to the blessing of God.*

The Atlantic Telegraph was laid. The Old

World and the New were brought into electric communication. Space and time were virtually annihilated, and the magic wire flashed the words with which it was intrusted across 2000 miles of sea almost as swift as thought could fly. Adopting the eloquent words of Edward Everett, the American statesman, we may ask: Does it not seem all but incredible that man should thus chain the lightning to his will, and compel it to travel in the track he marks out for it, and to register the intelligence he chooses to communicate to it? Does it not seem all but incredible that this intelligence should travel for 2000 miles, along those slender copper wires, far down in the all but fathomless Atlantic, never before penetrated by aught appertaining to humanity, save when some foundering vessel has plunged with her hapless company into the eternal silence and darkness of its depths? Does it not seem a miracle of science that the thoughts of living men, the thoughts that we think up here on the earth's surface, in the cheerful light of day—about the markets, and the exchanges, and the seasons, and the elections, and the treaties, and the wars, and all the commonplaces of daily life—should clothe themselves with elemental sparks, and shoot with fiery speed, in a moment, in the twinkling of an eye, from hemisphere to hemisphere, far down among the uncouth monsters that wallow in the nether seas, along the wreck-strewn ocean-bed, through the oozy dungeons of the rayless deep; that the latest intelligence of those boundless fields of golden grain now waving in a western wind and ripening under a western sky should go flashing through the unsympathizing waters; that messages of love and friendship, from warm, living bosoms, should speed, it may be, among the bleached skeletons of men and women whose lives were sadly ended amidst the tempest and the wreck?

It cannot be doubted that among the great scientific achievements of the nineteenth century, the Atlantic Telegraph, the precursor of those numerous deep-sea cables which now bind all the shores of earth together, will always hold a foremost place. And while we do justice to the surpassing skill and seemingly inexhaustible invention of the men of science who realized the idea, let us be honest, and remember that that idea sprang from the large sympathies of Cyrus Field, and that it became a fact because he never failed in his hope, never wavered from his faith, and never rested from his self-undertaken toil! It is fitting, says John Bright, you should honour the man to whom the whole world is debtor. He brought capital and science together to do his bidding, and Europe and America are for ever united. His is a purer and more lasting fame than that of an Alexander or a Napoleon!

It should be remembered that the *Great Eastern*, in this last expedition, had two objects to accomplish: first, to lay down the new cable; and, second, to recover and repair the old, so that the two continents might be connected by a double line of communication. We have seen how the first was carried out; the reader's attention must now be briefly directed to the second.

Her consorts, the *Albany* and the *Terrible*, were on their way back to mid-ocean as early as the 1st of August. On Thursday, the 9th, the *Great Eastern* and the *Medway* put to sea. They reached the appointed rendezvous on Sunday, and soon joined company with the *Albany* and *Terrible*, which had been engaged in placing buoys along the line of the submerged cable. All the ships then cast overboard their grapnels, and began to drag the ocean-bed in different directions. On Friday, the cable was caught by the *Great Eastern*, and actually brought to the surface, showing itself against the emerald waves like a long black serpent with a white belly. "On the appearance of the cable," says Mr. Deane, "we were all struck with the fact that one half of it was covered with ooze, staining it a muddy white, while the other half was in just the state in which it left the tank, with its tarred surface and strands unchanged, which showed that it lay in the sand only half embedded. The strain on the cable gave it a twist, and it looked as if it had been painted spirally black and white."

The arrival of the cable was saluted by the crew with a tremendous British cheer; but their exultation was premature. The strain applied by the machinery proved to be too great, and before the cable could be hauled on board its strands gave way; it broke close to the grapnel, and sunk to the bottom!

Keen was the disappointment; but there was no help for it. The search must be recommenced. Two days later it was caught again, brought up within a thousand fathoms, and buoyed. Then for two days more the wind raged so violently that nothing could be done. In fact, for a whole fortnight the weather proved so unfavourable, with such a succession of contrary gales and dense mists, that all the persevering efforts of officers and men on board the different ships were constantly baffled. On the 29th, the *Terrible* was compelled to make for St. John's, her supply of provisions having failed. The three other cruising ships then resolved to try their fortune about one hundred miles to the east, where the depth of water was not so great. In a few hours they reached the appointed rendezvous, and had set their buoys. It was the last day of August. There was no wind; the sky was blue as a sapphire, the sea unruffled as a summer lake. For the *thirtieth* time the grapnel sank deep, deep into the waters. Every eye was on the watch for some indication of success. And, happily, just before midnight it found the missing treasure, and fastened its iron teeth firmly upon it.

With great caution and intense excitement the men began to haul in.

In about five hours the cable had risen to within a thousand fathoms of the surface. Increased caution, and, necessarily, increased excitement!

To make assurance doubly sure, the *Medway* was ordered to grapple for the cable, which it did successfully, and thenceforth the work was double.

But why describe every stage of the slow, laborious, and difficult process? It is enough to say, that in the first gray light of Sunday morning the cable was safely brought on board, and, after the electrical tests had been applied, was pronounced uninjured!

Intimation was sent to England by the cable itself of its fortunate recovery; and the broken end havi[illegible]en repaired and spliced to the unused section, the *Great Eastern* once more turned her huge bows to the west, and began the process of paying it out. And so it befell that on Saturday, the 7th of September, the second Atlantic cable was safely landed at Heart's Content.

Here we conclude our history of the Atlantic Telegraph. The conquest of the Sea has been attempted, and at last achieved. Since the year of victory, 1866, two other ocean-cables have been laid. Twice has the *Great Eastern* crossed the broad Atlantic with 2000 miles of iron cord in her wake, and now four cables connect the Old World with the New. Every day, and every hour, intelligence, swift as the lightning, flashes from continent to continent; and the events which make up the current history of Europe are known in America as soon as here. The speeches delivered in the evening sitting of the British Parliament are sometimes printed entire in the New York papers published on the following morning; and a Gladstone's stately eloquence or a Disraeli's epigrams are read by American readers and British readers almost simultaneously. During the Franco-Prussian war, the sanguinary battle of Gravelotte was described sooner and more fully in a New York newspaper than in any of the London journals. Similarly, all the quick phases of European politics, the rise and fall of cabinets, tales of adventure and enterprise, narratives of shipwrecks and conflagrations, are immediately recorded for the benefit of American readers. But not only these greater and more important events which affect the fortunes of states and peoples, but tender private histories, touching domestic secrets, are whispered, so to speak, into the ear of the sea; words of love, happiness, and home, or of sorrow, pain, and death. Distant families, as well as distant nations, are united as by a sympathetic nerve, along which the swift current of human thought and feeling moves incessantly to and fro.

And thus the Atlantic Telegraph, so long regarded as the dream of a visionary, is now a mighty reality, which plays an important part in the world's daily life. The result appears to us one of the greatest which has been achieved in our age, and its projectors deserve those honours we are accustomed to bestow on the benefactors of mankind.

In the foregoing narrative we have necessarily confined ourselves chiefly to *one* individual, whose figure stands out foremost in the great enterprise from first to last. And yet we are sure he would not ignore, nor wish others to ignore, the admirable services rendered by his brave "companions in arms." On repeated occasions, where public allusion has been made to his work, he has borne the most cordial testimony to the distinguished engineers and philanthropists who, in Europe as in America, assisted in carrying out the bold design; without whose assistance, indeed, it could not have been carried out. Great Britain may well be proud of the part she has taken in it. Its Government, from the beginning, gave the undertaking its strong and liberal support; assisting it by liberal subsidies, and by the ships and officers of its navy. It was in London that Mr. Field found the capital he could not obtain in his own country. Nor has he failed to express in grateful language how much he, and the world, were indebted to England's famous engineers, her Stephenson and Brunel; to her men of science and practical electricians; to her gallant officers and seamen. Scotland, too, contributed to the cause two distinguished names: Sir William Thomson, second to none for extensive scientific knowledge and philosophical intuition; and Sir James Anderson, the able and resolute commander of the *Great Eastern*, who twice carried the leviathan vessel in safety across the deep. To all these men, not England alone, but the whole world owes a debt of love and reverence.

Because it so vividly illustrates the force and value of high moral qualities and persistent resolution, we attach a special importance to the lesson conveyed by the story of the Atlantic Telegraph; a lesson of the great results to be attained by lofty motive, direct purpose, and steady and persistent effort.

APPENDIX.

SOME extracts from Mr. Cyrus Field's speech at the Banquet given to him, under the presidency of the Duke of Argyll, in Willis's Rooms, London, on Wednesday, July 1st, 1868, can hardly fail to interest the reader.

In proposing Mr. Field's health, the Duke said :—

"I believe the success of this enterprise would have been delayed for many years—perhaps for whole generations of men—had it not been for the single exertions, for the confidence and zeal, for the foresight and faith, amounting as I think to genius, of our distinguished guest, Mr. Cyrus Field......Of all commercial enterprises which have ever been undertaken, this one on the part of Mr. Cyrus Field represents the noblest and purest motives by which commercial enterprise can ever be inspired. I believe it was the very greatness of the project—the great results which were certain to issue—I believe it was this, and this alone, which supported him with that confidence and decision which, through many difficulties and many disappointments, has carried him at last to the triumphant conclusion of this great project......Let me also say this—and this is a point which I have ascertained from other sources—I believe so great was the confidence of Mr. Field in the triumph of this great undertaking, that he risked every farthing of his own private fortune in promoting its success. On these grounds, ladies and gentlemen, I ask you to drink his health. But on one other ground also I ask you to drink it—and that is this, that he is personally one of the most genial and kindly hearted of men. At a time when his country was in great difficulty, and when many Americans thought at least they had something to complain of in the tone of English society, I was in the constant habit of meeting Mr. Field, and I never saw his temper ruffled for a moment—I never heard any words fall from him but words of peace between the two countries; and I often heard him express a hope that a time would come when a better understanding would arise in the minds of the people of this country and those of the United States; and I have reason to believe that his services and exertions in the United States have not a little contributed to secure the return of that feeling, what I believe is the real and permanent feeling of the people of those two great countries. Allow me, then, to ask you most heartily to drink this toast with me—The health of Mr. Cyrus Field, as the promoter of this great enterprise, and as a gentleman whom we all know and honour."

Mr. Field, in reply, said:—

"My Lord Duke,—With all my heart I thank you for the kind words which you have spoken, and which are the more grateful to me, coming as they do from one who was my country's friend in the hour of darkness and seeming disaster. To you also, my lords, ladies, and gentlemen, I equally return my thanks for the cordial manner in which you have received the generous sentiments expressed by your distinguished president. Most sincerely do I wish that I had the power to express to you all that I have it in my heart to say, and to make my voice respond to the gratitude I feel for all the kindness I have received in this country......I will not detain you with any lengthened remarks in regard to the Atlantic Telegraph, with its more than fourteen years of varying fortunes; nor with any account of the anxious days and sleepless nights which have been passed by those who were engaged in bringing the undertaking to its final consummation; nor with any narrative of what has been done to realize apparent impossibilities by so many who are now seated around this board. The laborious scientific investigations in the closet, the laboratory, the workshop, upon and beneath the sea; the accurate soundings of the Atlantic; the careful and increasingly perfect manufacture of the cables; the wonderfully effective mechanical appliances used to lay them, and to recover and complete the one that was lost; the skilful seamanship exhibited in the sure guidance of all the movements of the vessels; the unsurpassed enterprise of the capitalists, without whose profuse expenditure the Atlantic Cable would still have remained a chimera; the ability with which the affairs of the several Companies were conducted by the directors and officers; the generous aid of the English and American Governments in connection with the successive expeditions, and that of the Government of Newfoundland in granting valuable privileges—in a word, the unexampled combination of nautical, electrical, engineering, financial, and executive resources—all this is best told by the simple fact that two cables are in perfect working order across the most stormy ocean in the world, a distance of nearly 2000 miles, more than two-thirds of which is over two miles in depth; and that messages are passing with lightning speed from continent to continent......I most fervently thank God that I have been permitted to live to see this enterprise, which binds your country to mine, completed; and that I am privileged this night, with some members of my family, to meet our English friends, and with them to rejoice over its success. I rejoice, because the cable brings into closer union the two great Anglo-Saxon nations of the world, which have a common origin, inherit the same glorious traditions, and are so bound together that if one were to receive a blow both would suffer from the shock. I, an American, feel pride in remembering that my ancestors were English citizens, and lived and died under your flag. And do not all true Englishmen glory in the fact that the small expeditions which sailed from these shores some 250 years ago, and settled at Plymouth and on the banks of the James River, were so multiplied and replenished that at the time of the Declaration of Independence the original handful had increased to 3,000,000 of people; while, in less than a century the 3,000,000 have grown into a nation of 35,000,000, and now, thank God, not one slave among them; with a territory extending from the Atlantic to the Pacific, from the St. Lawrence and the Great Lakes to the Gulf of Mexico. There are, undoubtedly, many now within hearing of my voice who will live to see within the limits of the existing United States one hundred millions of people all speaking the English tongue. While, when I think of the greatness of England, I always remember the words of the American orator who said that she 'is a power to which Rome, in the height of her glory, is not to be compared; a power which has dotted over the surface of the whole globe with her possessions and military posts, whose morning drum-beat, following the sun, and keeping company with the hours, circles the earth in one continuous and unbroken strain of the martial airs of England.' To this I would add the hope, that ere long every one of the numerous and scattered dependencies, which suggested to Daniel Webster the noble figure America has enshrined in her classics, will be united to the mother country by the electric bond, and that it may be in the power of the Sovereign and her Minister, or of the merchant on 'Change,' to hold instantaneous converse with all or any of the races, nations, and tribes which yield obedience to the mild sceptre of the good Queen Victoria. I pray that hereafter no jealousies may be allowed to create a wall of separation between England and America; that all the ill-feeling that has been engendered between the two countries may be buried so deep in the Atlantic that the ingenuity of man shall never invent a grapple to drag it to the surface; and that the only rivalry between them shall be the rivalry of co-workers in efforts to promote peace, industry, and commercial intercourse, and to extend the blessings of civil and religious liberty throughout the world."

Mr. John Bright, M.P., in the course of an interesting speech, bore noble testimony to the high qualities of the hero of the evening. He said :—

"I rejoice very much at this banquet, because we are met to do honour to a man of rare qualities, who has conferred upon us—and I believe upon mankind—rare services. I have known Mr. Field for a good many years, and although, I dare say, to any sailor who may be here it is not much, to me it seems a good deal, that Mr. Cyrus Field, in the prosecution of this great work (not being a sailor,—always bear that in mind) has crossed the Atlantic more than forty times; and he has, as you know, by an energy almost without example, by a courage nothing could daunt, by a faith that nothing could make to falter, and by sacrifices beyond estimation—for there are sacrifices that he has made I would not in his presence relate to this meeting—aided by discovery and by science and by capital, he has accomplished the grandest triumph which the science and the intellect of man have ever achieved. Soon after the successful laying of the cable, I had an opportunity of referring to it in a speech spoken in the north of England, when I took the liberty of describing Mr. Cyrus Field as the Columbus of the 19th century; and may I not ask, when that cable was laid, when the iron hand grasped in the almost fathomless recesses of the ocean the lost and broken cable, if it be given to the spirits of great men in the eternal world, in their eternal life, to behold the great actions of our lives, how must the spirit of that grand old Genoese have rejoiced at the triumph of that hour, and at the new tie which bound the world he had discovered to the world to which, but for him, it might have been for ages to come unknown !......I believe no man—not Cyrus Field himself—has ever been able to comprehend the magnitude of the great discovery, of the great blessing to mankind which we have received through the instrumentality of him and his friends, the scientific men by whom he has been assisted. I say with the greatest sincerity, that my heart is too full, when I look at this question, to permit me to speak of it in the manner in which I feel that I should speak. We all know that there are in our lives joys, and there are sometimes sorrows, that are too deep for utterance, and there are manifestations of the goodness, and the wisdom, and the greatness of the Supreme which our modes of speech are utterly unable to describe. We can only stand, and look on, and wonder, and adore. But of the agency—the human agency—concerned, we may more freely speak. I honour the great inventors."

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